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Electrical Review

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CONTENTS:

	PAGE
Electric Motive Power for Home Industries	605
Freight Rates	606
The Independent Telephone Convention	606
The British Electrical Engineer Volunteers in South Africa	607
New York Electrical Society	608
Committee on Standard Candle-Power	608
Automobiles as a Source of Revenue for Central Stations	608
Science Brevities	610
The Independent Telephone Convention	611
The North Electric Company's Cleveland Exhibit	615
Electric Equipment of the New York Elevated Railways	615
A New Telephone Manufacturing Company	616
Telephone Convention Notes	616
A Horseless Horse	620
A Handsome Desk Telephone	620
Wall Street and the Electrical Stock Market	620
Telephone and Telegraph	621
Lightning Rods	622
Independent Telephone Association of Wisconsin	623
A New Type of Warehouse Telephone	623
The Manhattan Alternating Enclosed Arc Lamp—A Correction	623
Electric Lighting	623
Electric Railways	624
John G. Milburn, President of the Pan-American Exposition	625
Reserve Power for the Pan-American Exposition	625
Electric Motive Power for "Cottage" Industries	625
Industrial Notes	626
Export Notes	626
The Knickerbocker Telephone Company	626
Personal	627
Electric Railway Developments in New Jersey	627
A Decision in the Magnetic Blow-out Case	627
A Lightning Protector for Low-Tension Circuits	627
Automobiles	627
Corporation News	628
The Electric Street Railway in St. Johns, Newfoundland	628
Electrical Patents	35

Advertisers' Index, page 22

ELECTRIC MOTIVE POWER FOR HOME INDUSTRIES.

On another page is the description of an experiment now being made in the supply of electric power to those engaged in small home industries in the neighborhood of Budapest, in Hungary. There has been considerable discussion as to the merit of this variety of power transmission and distribution from the two points of view of the central generating station and of the householder who receives the power supply. In certain districts of France, notably, at St. Etienne, where the ribbon makers are very numerous, the same plan has been tried with considerable success, apparently, from the mechanical and electrical point of view.

The conditions surrounding certain industries in Europe are widely different from those marking similar industrial operations in this country. For example, the manufacture of watches in Switzerland is not carried on in factories, as it is here, but each manufacturing headquarters distributes periodically to its workmen crude material and parts of watches, and these are fabricated and assembled at the homes of the workmen. A similar state of things exists in the lock making and gun making industries of France and Germany, as well as in ribbon weaving, lace making and other similar small mechanical crafts. It seems that the idea of gathering together, in a factory building, the personnel of one of these industries is repugnant to the workmen, who prefer the greater freedom of home work where they make their own hours and are under no direct supervision. It is to this class that it is proposed to distribute electric power in small units and at small cost, and the experiment is awaited with much interest by those engaged in manufacturing on the other side.

The fact that such an industrial condition prevails in the manufacture of small machinery, etc., in Europe, is one of the reasons why continental manufactures have not been able to compete, even in their own markets, with those turned out in this country. Manufactures conducted under the system described above necessarily fail in the all-important requisites of standardization of sizes and ability to interchange parts. Every watch, for example, made in the Swiss villages is unlike every other watch, and has its individual peculiarities. Those turned out from an American factory, where they are made by machinery, are interchangeable in all their parts, exactly alike and represent the product of a higher degree of skill and cumulative experience than can ever be obtained by individual workmen. There is nothing particularly interesting in the methods employed for distributing electric power to these home industries, but the fact of their existence is exceedingly enlightening to those who wish to understand European trade conditions. In this country we have practically only one home industry of this sort—the sweat-shop.

In these columns, some time ago, attention was called to the forlorn appearance of the ordinary automobile, which looks like a vehicle in search of a horse. Designers have stuck so closely to the lines of the familiar horse vehicle that one feels a sense of loss and looks in vain for the absent horse when an automobile passes. A European inventor has proposed a bold and radical solution to this difficulty by making the automobile itself in the shape of a horse and hitching it in front of the ordinary carriage. This remarkable invention is illustrated and described on another page of this issue. While it is claimed that the automobile horse is gentle and will not shy, that it is not afraid of newspapers in the road and will not fall down in the shafts, it is not said whether it will stand without being tied, switch its tail over the reins in flytime, or chew up wooden fences and flower plots. Information is anxiously awaited.

FREIGHT RATES.

At the last convention of the National Electric Light Association, the committee on freight classification, after three years of continuous effort to get some sort of satisfactory treatment from railroads, reported in effect that the matter of adjusting freight classification on electrical manufactures be put into the hands of counsel and brought into the United States courts, so that it may be finally determined.

In this country freight is divided arbitrarily into a number of classifications, first, second, third, fourth, etc., and charges are based upon the weights of the articles, the distance to which they are transported and the class to which they belong. Electrical machinery, as a whole, is considered first-class, and pays the highest rate of freight except that charged for very fragile and valuable articles which are put in the class called "double first-class." Hence it has resulted that any part of electrical apparatus pays proportionately the high-class rate, so that castings for small pumps, for example, may be shipped in small lots as third-class, cheap freight, while heavy castings for dynamo frames have to pay about three times as much, being classed as first-class freight.

Dynamos, armatures, motors, field and other castings in less than car-load lots, are all considered first-class, but all similar heavy machinery that does not have the word "electrical" in its name is invariably rated as third-class. Lamp chimneys and lamp shades of glass are rated first-class, while incandescent lamp bulbs and glass bulbs used in making lamps pay twice as much, being rated as "double first-class freight."

These are a few of the glaring inconsistencies that are repeated in the freight classifications of all American railroads. Although they have been appealed to in practically every way, the railroad companies decline to take any action toward equalizing and amending the classification, and it is on this account that the committee has recommended that the matter be brought into court and finally settled. To this suggestion every member of the electrical profession should heartily agree. When classifications were extended to include electrical apparatus in the early years of the industry there was a profound belief that all such was fragile, expensive and easily injured, and consequently that it belonged in the classification of freight paying the highest charges. While there may have been some grounds for this belief fifteen years ago, there certainly is none to-day, and why the electrical business should be saddled with this incubus is hard to tell. At any rate the time has come to show the railroads the error of their ways, and it is reasonably certain that this will not be difficult to do in the courts. In this way the railroad companies may be made to take such action as is necessary to make their rates equitable.

The directors of the Manhattan Elevated Railway Company, of New York, have at last awarded contracts for the full equipment of that system with electric traction. This railway system was the scene, fourteen years ago, of the first experiment in heavy railway traction. For six or seven years it has been definitely known that its equipment with electricity would save large sums annually and would result in an enormous betterment of the service given. Like many other public service utilities enjoying a peculiar field to themselves, the elevated railway company evidently considered that its ancient and ill-kept equipment of steam locomotives and cars was good enough for the public. Whether it has been influenced to make the change to electricity by the dawning of reason, or the active competition of the electric surface lines, or the threatened and impending competition of the rapid transit subway line is not known. The good work has been done, however, and before many months have passed the puffing locomotives and the flying cinders of the present *régime* will be only disagreeable memories.

The subscribers of the ELECTRICAL REVIEW will receive their papers this week one or two days late. It was decided that the telephone convention, at Cleveland, was so interesting and important that a delay of a day in order to describe it adequately would be better appreciated than a delay of a week in the appearance of the convention news in order to mail the ELECTRICAL REVIEW on its usual day of publication.

THE INDEPENDENT TELEPHONE CONVENTION.

The convention of the independent telephone interests of the United States, known as the "Independent Telephone Association of the United States of America," which has just concluded its sittings at Cleveland, Ohio, was highly successful in many respects and notably so in the large number of attendants, the enthusiasm and interest displayed by all hands, and the character of the men who took part in its councils. No one looking at these men could fail to see that they were earnest, practical workers in the field of telephony, and the class of men from whom results are to be expected. Perhaps no other feature of the convention was more marked than the enthusiastic activity and evident intelligence of the delegates attending it.

The rise of independent telephony has been remarkably rapid. It is only six years old, and this convention was only the fourth annual meeting of the independent interests. In these few years independent exchanges to the number of 3,000 have been established, and to them are connected the amazing total of a million telephones, representing nearly one-half the total number of telephones in use in the United States.

The address of President Thomas, which will be found on another page, contains much information of interest and significance. His plea was for a closer association of the independent companies.

Everybody who went to the Cleveland convention had an enjoyable time and was much benefited. The weather was perfect and the hospitality of the entertaining committees all that could be desired.

In last week's issue of the ELECTRICAL REVIEW was published a very interesting description, by Professor John Trowbridge, of the great experimental storage battery plant in the Jefferson physical laboratory, at Harvard University. Professor Trowbridge has recently doubled the size of the plant, and it now consists of twenty thousand cells; it is the largest experimental battery in the world, and, at a pressure of three million volts, produces sparks six and one-half feet long, which exhibit all the chief peculiarities of lightning. Professor Trowbridge expects to achieve some unusual and interesting results with the aid of this wonderful battery.

The British Electrical Engineer Volunteers in South Africa.

The corps of volunteer electrical engineers of the British army is now in South Africa, in command of Major Crompton. This corps, as has been mentioned before in these columns, is composed of electrical engineers who have volunteered for service, and is the first of its kind ever to see actual service in the field. As distinguished from our regiments of volunteer engineers, in the Spanish War, this corps is composed ex-

FIG. 1.—SEARCHLIGHT AND TRAIL FOR FIELD WORK.

clusively of electricians. It sailed to South Africa in two detachments, on March 16 and April 14, taking with it two complete equipments of searchlight trains, consisting of four wagons, two traction engines, each being fitted with a dynamo, and four searchlights and limbers. In addition to these, a spare dynamo, 24 arc lamps with portable lanterns, and 200 incandescent lamps were taken out. A number of bicycles, about 20 in all, of which six are fitted with special cable-laying drums, went out to work in connection with the field telephones, and to help keep the communications.

On April 14 Major Crompton himself, with a second contingent of about 10 men, sailed for South Africa, taking with them a third traction engine. This engine will, in all probability, join the first contingent, although Major Crompton himself has received instructions from the War Office to proceed, independently of his corps, to confer with Field-Marshal Lord Roberts on the subject of transports generally in South Africa, as well as on the question of electricity in the field.

One of the traction engines is shown herewith, the illustrations being from our London namesake.

A great many details have had to be worked out in connection with the searchlights. A searchlight suitable for cross-country work has never been designed before, and those illustrated here seem specially suitable for the work. The gun-metal bases of the searchlights revolve on ball-run turn-tables, and a degree circle is fixed in the centre, with a movable pointer, which enables the beams of light from a number of searchlights to be got into line with the least trouble. The wheels on which these trails are mounted are standard wheels from the Royal Arsenal, which ensures their all being interchangeable. The trails themselves are mounted on springs, but are otherwise similar to gun carriages. The searchlights can be detached from their trails, and, if required, can be used as stationary projectors on the ground. It has been found advisable to mount the mirrors, glasses and divergers in aluminum, in order to lighten the designs as much as possible The re-

FIG. 2.—MAJOR CROMPTON, IN COMMAND OF BRITISH ELECTRICAL ENGINEER VOLUNTEERS.

flectors are manufactured under Cowper-Coles's patent, and are of deposited copper faced with silver, with a thin coat of palladium to prevent tarnishing. The divergers are manufactured by Chance Brothers. The searchlight lamps have had to be entirely remodeled, as it was thought that the pattern service lamp was far too heavy and clumsy, and at the same time unsuited to withstand the vibration that must be encountered on the road.

The new mechanism in the lamp locks the movable carbon-holder in position after the arc has struck, the feeding movement being controlled by a shunt coil acting on the other carbon. A drop in volts of 52 can be allowed between the traction engine and the searchlight, which enables the engine to be distant a mile or two from the searchlight if necessary. The elevating motion of the searchlight is worked by a worm, whilst the horizontal motion, which is used largely for signaling purposes, has to be worked quickly, and is, therefore, done by hand, the turntable being fixed when required by a locknut in the centre. It is of some importance to get the vertical motion accurate, whilst this is of small importance in the case of the horizontal motion. Drag-hooks are fixed at the end of the axle, and by means of these the searchlights can be hauled along by hand. The searchlight trail is fitted with a powerful screw brake, which is worked from the back when traveling. On to the trail is attached an ammeter, voltmeter, and main switch, and these can be placed either in front or on the back, and can be changed about if found necessary. The searchlight trails have been manufactured by Messrs. Thornycroft, while the design and the manufacture of the searchlights and lamps have been carried out by Messrs. Crompton & Company.

One of the most useful sections of this equipment is the telephone section. A number of cycles have been taken out, six of which have been fitted with cable drums behind, the drums being mounted above the back wheel. It is found that a

FIG. 3.—BICYCLE TELEPHONE OUTFIT FOR FIELD WORK.

cyclist can ride along at the rate of eight to 15 miles per hour, and lay the wire behind him without any fear of kinking or breaking. A very light brake is fitted on these drums to prevent the wire overrunning. Each of these drums holds about two miles of bare copper wire. After use the wire is wound up by hand; the cyclist wheels his bicycle with one hand, and with

the other winds the drum by means of a detachable handle, the wire being led over the handle bar by means of a guide. The wire can be picked up at the rate of about four miles per hour. It is found that with a bare copper wire of this description, and using the earth as the return circuit, one can speak for three to four miles with the wire trodden into wet ground, and even with a broken wire.

The telephones themselves are of the Swedish cavalry pattern, and can be used either for speaking purposes, or, by using the "buzzer" through a high resistance or leaky circuit for signaling by the Morse code. The telephones are arranged with a third terminal, coupled up through a condenser, and this will enable an enemy's wire to be tapped without in any way interrupting the conversation. By the same means a commander can make contact with his own wire and hear the orders being given by his subordinates. By being able to provide speaking communications between two fixed points at the rate of 15 miles per hour, considerable advantage may be derived, while the remaining bicycles are likely to be of use in the way of carrying messages, etc.

New York Electrical Society.

The annual meeting of the New York Electrical Society for the election of officers and the presentation of the secretary's and treasurer's reports, will be held at the College of the City of New York, corner of Lexington avenue and Twenty-third street, at 8 P. M., Thursday, June 14.

Mr. E. W. Caldwell will give a talk on "Late Advances in Ruhmkorff Coil Interrupters." Although much has been written on these types, no actual demonstration of their possibilities has been made before the public. The construction of these interrupters will be explained and their application to Roentgen-ray work illustrated. Various forms of electrolytic and liquid interrupters will be shown.

Committee on Standard Candle-Power.

In the report of the Committee on Standard Candle-Power of Incandescent Lamps of the National Electric Light Association, printed in the ELECTRICAL REVIEW for June 6, the name of Mr. Calvin S. Rice was omitted from the signatures to the report. Mr. Rice was an active member of the committee, but was not present at the Chicago meeting to sign the report. Hence the accidental omission of his name.

Dr. Henry S. Pritchett, superintendent of the Coast and Geodetic Survey and president-elect of the Massachusetts Institute of Technology, and Miss McAllister, daughter of the late Hall McAllister, of California, and niece of the late Ward McAllister, were married at the Episcopal church at Chevy-Chase, near Washington, D. C., on June 9.

AUTOMOBILES AS A SOURCE OF REVENUE FOR CENTRAL STATIONS.

BY ELMER A. SPERRY.

(*Concluded from page 596.*)

Another factor destined greatly to increase the radius of action of electric vehicles, and the consequent demand for power is roadway improvement. The present good-roads agitation is certainly in line of progress, and should be given all possible aid and encouragement. In this connection, I see no reason why we could not wisely follow the plan, based on historical precedent, of utilizing for this important work of permanent improvement our convict labor, the disposition of which in this country has always been a source of embarrassment to the authorities. This system certainly has much to recommend it, and the improvement of our roadways calls for a vast expenditure of labor and has much need of a uniform and systematic effort.

The fact remains, and has been emphasized within the past year, that progress in electric vehicles has not been as rapid as was expected, and causes have existed that were not before seen and that were not generally understood. Some vital reason seems to have prevented the rapid development and general adoption that at one time seemed assured. Was it the element of cost? Two important conditions stand out prominently in connection with electric road vehicles; these are, first cost and cost per mile of operation. It is not my purpose to discuss the first, as there are endless variables entering into the question, and it is doubtless true that the prices will gradually decrease. This part of the problem is always found to be self-correcting, and even to-day, with the electric, the cost per pound of vehicle complete is lower than other and far less available and pleasurable systems.

The cost of electric power for automobiles has been demonstrated in Paris to be less than with any other power system, and surely this factor is not the one now preventing the wide adoption of electric vehicles. In a paper before the American Institute of Electrical Engineers, G. F. Sever and R. A. Fliess, of Columbia University, give results of extended trials with electric delivery service in New York city. It is shown that with present power and rolling friction factors there is effected a saving of nearly two and one-half cents per car mile over horse service; and with the capacity of many more miles per day than with horses. With a daily service of 36 miles, a saving of 356 hours per year of actual delivery service per vehicle is effected. The average horse was found to have a capacity for three hours' work per day at the rate of seven miles per hour. The authors state, "The figures given above speak for themselves, and would appear to be most effective argument in favor of adopting electric automobile delivery service."

A popular notion exists that carriage batteries and electric batteries are charged with a certain number of miles. It requires only a second thought to see the error and delusion embodied in this idea. It is evident that a battery when fully charged contains not miles, but electrical power, which may be expressed in horse-power, and which is proportional to the size and capacity of the particular battery in question. With this in mind it will be readily seen that the statement that carriage contains a capacity to run a given number of miles would only be true when a certain standard pavement or roadbed is considered, because it is found that it requires very much more battery power to drive a carriage a mile on a soft, uneven and hilly road than it requires on a smooth, hard and level road. It should always be understood that a standard pavement or roadbed is considered.

Again, for instance, where two motors are employed the power and efficiency is divided, requiring, it is found, a larger amount of power from the battery to drive a vehicle of given weight a mile upon standard road; again, the mechanical condition of the bearings, or amount of rolling friction present, in carriages of different makes also varies. It is evident, therefore, that a number of important considerations should be included in any attempt to give a definite or prescribed mileage capacity to electrical vehicles and their batteries.

In electric road traction the consideration of prime importance is the battery. What is its efficiency, its durability, and, above all, at what cost will it produce a ton mile?

We will confine our attention in the following remarks to that class of storage battery known as the lead-lead element. These batteries are of two general kinds, the one having its active material formed or developed from metallic lead, Planté's process, the other having its active material mechanically applied, the Brush or Faure process.

A prominent German writer, giving results of recent tests, states that an average carriage, with a Planté battery, would run 20 miles per charge, the battery weighing 1,260 pounds, yielding 2.8 ampere hours per pound, 5.25 watt hours per pound, and requiring 51 pounds of battery per ton mile; whereas, with the Faure battery of the *same capacity*, he found the weight to be 980 pounds, yielding 3.6 ampere hours per pound, 6.5 watt hours per pound, running the same carriages an average of 29 miles requiring 30 pounds of battery per ton mile, showing a life of 3,000 and 4,000 ton miles. This simple report reveals the fact that batteries of different weight though possessing the same capacity, will propel the same vehicle different distances, requiring a marked difference in the pounds of battery per ton mile. One of the highest engineering authorities in storage batteries recently stated:

"The advantage which would follow the introduction of a high capacity cell would not be merely the extension of the radius of action of the electrical vehicle, but would be a lengthening in the life of the battery itself. This is brought about by the fact that it would almost entirely remove the most powerful cause for deterioration—that of over-discharge. Present batteries have 20 to 30 miles capacity. In the case of a battery capable of propelling a vehicle 60 miles on one charge, only the most inexcusable carelessness could bring it to the state of complete

discharge, for 90 per cent of the discharges would be for distances of less than 30 miles. Under these circumstances the battery would be seldom discharged over 50 per cent of its capacity, a condition of affairs which would insure a greatly increased life, probably between four and six times the life under present conditions."

The importance of proper manipulation, also proper adjustment of the capacities to the work to be performed, is here emphasized. Not only will it be seen that the life of the battery is improved, but, what is more important, the cost per ton mile is also materially reduced. In this connection it will be interesting to investigate the relation of the cost of operation per mile due to this factor, namely, the storage battery. Very little, if any, literature, is available on this all-important subject, and, in fact, so little experience up to the present time has been available, and so little information has been given out, that it is not surprising that only meagre records of this function exist.

Beginning with the supposition that the present heavy batteries, namely, those yielding about two and three-fourth amperes per pound, are possessed of a given life, certain deductions will be made by introducing series of variables yielding results and data, the bearing and significance of which is of more than passing interest.

Before entering upon a more detailed discussion, it might be well to state the result of more general observations in this line. The desirability of the electrical system of traction, the extent of its adoption, and the consequent extent of the demand of the central station for supply, will depend upon the earning capacity that can be demonstrated. The value and present cost of the same work are both known factors. The question remains, what is its cost under the new conditions? Under practical conditions of operation, a battery having a life equal to 1,000 ton miles will drive a vehicle weighing a ton 1,000 miles, or a vehicle weighing two tons 500 miles. For purposes of illustration of the possible cost of this factor, let us assume that this battery costs $500. It will then be seen that each cab mile covered in the latter instance will cost one dollar; which would, of course, prohibitive. Nevertheless, it is a fact that batteries have been made and marketed, and, what is still more serious, others have been so misused in practice as to have a life less than above assumed. Suppose the average life of the battery to be five times that assumed; the new cost per cab mile will be 20 cents.

In the early stages of any industry, conditions are often found to exist, the practical results of which, though startlingly disappointing, are finally met and overcome; and especially is this true where the result is an important one, and where capital and skill are available. This is most certainly true of the art under consideration, and within the past year advances have been made that are favorable in the extreme; advances that are destined to reverse the adverse verdict, and to place the art of electric road traction by batteries high above possible criticism.

Taking unity as a basis of the battery factor in the cost per mile, we will proceed to introduce the variables as to weight and cost, and to note the results. Suppose we assume that the heavy battery is about half the total weight carried. Engineer Maxim, in his Milwaukee paper, says 45 per cent; this is close enough to 50 per cent for present purposes.

First, assuming a battery of *same capacity* to *weigh one-half*. It will at once be noted that the vehicles carrying battery of only one-half the present weight can easily be made one-eighth lighter, giving a total reduction of weight of one-fourth plus one-eighth, or three-eighths. The capacity remaining the same, the lighter combination, or new carriage, will be propelled unity divided by 625, or 1.6 times its former mileage. This factor, 1.6, represents the new mileage, yielding the new cost per mile of five-eighths, or .625. In the above calculation it has been assumed that the lighter battery costs the same as the heavier battery, or twice the cost per pound.

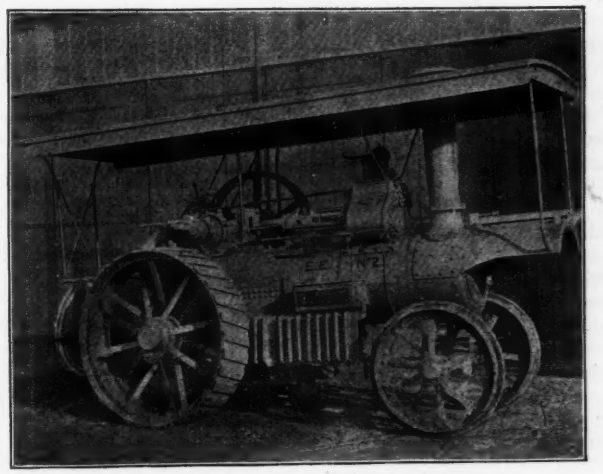


FIG. 4.—TRACTION ENGINE FOR FIELD SEARCHLIGHT; WITH THE BRITISH ELECTRICAL ENGINEER VOLUNTEERS.

Light battery costing the same per pound as heavy battery. The cost is now reduced to one-half, but the battery is of the same capacity, and will propel the vehicle 1.6 times its former mileage. Introducing this factor, we have a new cost per mile of less than one-third (.31).

Important reductions in cost per pound of battery have been made during the past year. Let us now assume the following:

Light battery costing one-half per pound of the heavier battery, the cost becomes at once one-half of one-half, or one-fourth; but we must still introduce the mileage factor of 1.6, which yields 1.5, or a cost per mile of one-seventh (.155).

In the above calculations we have assumed only the original life of the batteries, with no renewals. It is found in practice that vehicle batteries with the renewals cost about one-half the first cost of battery, and the life by renewing is extended half the former period; a condition, it will be observed, that does not alter the cost factor per mile.

It has been found that a battery when exhausted weighs as much, and is possessed of its full quota of chemical Pb., and though heretofore it has been difficult to recover any portion of its original cost, at present, with the batteries of one maker at least, it is possible to recover and rouse the exhausted material over and over again at slight additional cost, the original total investment in lead being practically the only investment required.

Assuming, now, that these *renewals be made at half original cost,* and that the batteries be carried through only four such renewals, it is found that the whole battery cost and energy produced throughout its extended life is six-tenths of that during the first period, which alone has been considered above. Introducing this factor in the last result, we find a cost per mile of practically one-eleventh (.094).

Advances in the art have, however, gone further than reducing the weight of battery by one-half, and it is now possible to obtain on the market batteries of excellent life that have the original capacity with *one-third the weight.* With such a battery a vehicle required to carry one-third weight of battery can easily be made one-sixth lighter, making a total reduction of the combined weight of one-third plus one-sixth or one-half. This battery, having the same capacity, will push the lighter vehicle a distance of unity divided by one-half, or *twice the mileage* possible with the heavy battery; or at a rate of cost per mile of one-half (.5).

The last result assumes that the light battery (one-third weight) costs the same as the heavy battery.

Light battery costing the same per pound as heavy battery, the weight being only one-third the cost will, therefore, at once be one-third. But it will still drive the carriage twice the mileage, yielding a total cost per mile, of one-sixth (.166).

Light battery costing one-half per pound, there being one-third the weight, the cost will at once be one-sixth; the battery, still having the original capacity, will propel the carriage twice the mileage, as above, and will yield a total cost per mile of one-twelfth (.0833).

Carrying this battery through a course of four renewals under the conditions above stated with reference to renewals, we find that through the extended life of the battery the cost per mile has been (.0833 by .6 equals .05) equal to one-twentieth (.05).

The realization of these sweeping reductions in cost is all important. The results are evidenced as follows: Vehicles with live load, total weight of one and

one-third tons, have yielded 1,000 miles per discharge with batteries weighing less than 1,000 pounds. Partial realization of the desirable features yielding the results above given, will work economies that are proportionate. The above calculations are given not only as indicating the high point that has been attained in the development of traction batteries, but also as indicating the line in which future effort should be directed for still further advancement.

It will be seen in the test recorded from the German authority quoted earlier in the paper, that the values of 30 and 51 pounds per ton-mile were assigned. Values in this country for vehicles most frequently range between 28 and 50 pounds. As the result of experience, the author would state that this value should be held at or below 10, and vehicles that can easily show this value are in daily commercial service, which makes an extremely favorable showing. So light a battery lends itself readily to the duplication of batteries referred to as creating the necessary diversity factor. The results of the battery tests, so-called, made under the auspices of the Automobile Club of France, recently concluded, indicate that the best results must be expected from batteries in which the active material is retained with, or its retention in place upon the grid is materially aided by the use of proper envelopes; this being especially true with traction batteries. Furthermore, every means should be employed to shield the battery and to insulate the same thoroughly, not only electrically, but especially against jar and vibration. It has been demonstrated that concussion and molecular vibration are factors tending most seriously to disintegrate the elements. A plan has been devised that seems destined to secure this result; it affords a cushion support for the individual plates by the simple device of rendering the cap of the plate supports within the receptacle elastic and yielding, thus allowing it to perform the function of a cushion.

The success of the electric vehicle being thus assured, a steadily increasing demand for current is sure to follow, which will result in large business. This field belongs to the central station by right of discovery; but history repeats itself, and the opportunity will be lost if the territory is not occupied and its resources developed. The central-station organization and equipment is the proper guardian and natural source of expert service and attendance for both battery and machinery, and will naturally be looked to foster the interests that it shares with the vehicle operators. It has not been demonstrated that central-station owners should not be the principal operators themselves. Much can be said in favor of such a combination. In any event they should closely ally themselves with this important industry, and the earlier a practical experience is had by the station men themselves, the sooner will they understand the needs of the business, and the sooner will they be prepared to guide their patrons into a successful and widespread use of electric road-traction.

SCIENCE BREVITIES

The Formation of Planté Plates—The original Planté process, by which it took two months to form the plates, gave very excellent results so far as the durability of the plates was concerned, but the time required was too long for practical purposes. Accordingly various methods were tried to expedite the formation of a sufficiently thick layer of active material on the surface of the plates, which consisted principally of rubbing into them a paste composed of one of the oxides of lead, or of employing a forming bath which contained a small percentage of chlorine or perchloric acid, or some other substance which would eat into the lead. But it was soon found that the impurities which the oxides of lead usually contain were very injurious to the life of the plates, and that unless the latter could be thoroughly freed from the solution used in the forming bath, this continued to eat into them after the cells had been formed and were at work, says the *Electrician*. The fact that the formation process is thus continuing is shown by the increase in the capacity of the cell, and when this increase is rapid it means that the life of the plates will be correspondingly short. Many attempts, therefore, have been made to find a bath which would hasten formation, whilst at the same time its action would not be continued after the plates had been removed from it and been set up in the working cells. Dr. H. Beckmann states that he has been carrying out an extended series of experiments on the subject, and finds that an aqueous solution of sulphurous acid gives very good results if it is used as soon as it is prepared, and before the sulphurous acid has had time to oxidize to sulphuric, in which case the amount of peroxide formed is very small. The formation of peroxide of lead takes place readily in the presence of sulphurous acid, and in 23 to 24 hours the requisite capacity can be obtained, and it is claimed for this process that little or no subsequent increase of capacity takes place, since no substance injurious to the life of the plates is employed.

Identity of Radium and Cathode Rays—M. H. Becquerel has made a discovery which appears to decide the nature of one kind of Becquerel rays, at all events, those called "radium rays" by Curie. These, according to Curie's experiments, transport an electric charge, a fact which already points out a close analogy with cathode rays. The analogy would be made perfect if it could be shown that radium rays were subject to electrostatic as well as magnetic deflection, says one of M. Fournier d'Albe's extracts. This has been done by Becquerel, though not without encountering serious difficulties owing to the feebleness of the sources available and the consequent smallness of the deflection to be observed. He succeeded in proving photographically, by means of an electric field of a billion units, that the rays or particles proceed in a parabola having the vector of the electric field for its axis. Their velocity is something between half and two-thirds of that of light. On comparing the magnetic deflection of a beam with its electric deflection, the ratio e/m is found to be about 10,000,000, or the ratio of an infra-red vibration of the Zeeman ions. The energy expended is a few centimetre-gramme-second units per second, or a few ten-millionths of a volt. This would mean a loss of matter of about one milligramme in 1,000 million years. This explains the inappreciable loss of matter actually found.

Coherer Resistance — M. E. Branly recently read a paper before the Academié des Sciences on the resistance of coherers. As an example of the author's experiments, he took a tube filled with gold dust, the ends of which were closed with electrodes of pure gold. The diameter of the tube was 1.3 millimetre. When newly filled the resistance before any electric action had taken place was 400 ohms. The voltage was then put on to the tube through an external resistance of three megohms. After 30 seconds with a battery of eight volts the resistance of the tube had fallen to 160 ohms. With 16 volts it fell to 81 ohms, and with 160 volts to 25 ohms. A discharge from a Wimshurst machine in the neighborhood caused a still further reduction in the resistance, which finally fell to 6.5 ohms. When, however, the ends of the tube were touched with the two poles of the machine, the resistance augmented until it became higher than 10,000 ohms. The fall in resistance with voltage of the battery used in the first experiment was found to be more marked with a second tube filled with gold dust which had been obtained by precipitation. When, however, a tube containing peroxide of lead was used, exactly the opposite took place. For instance, the initial resistance was 630 ohms. Eight volts across the tube with a very high resistance in series increased this to 650 ohms, while an electro-motive force of 160 volts caused the resistance to rise to 2,070 ohms. In the same way a spark from a static machine further increased the resistance to 6,000 ohms. The author draws comparisons between the behavior of the finely-divided particles in the above experiments with results he obtained with platinized glass in 1891.

THE INDEPENDENT TELEPHONE CONVENTION.

FOURTH ANNUAL CONVENTION OF THE INDEPENDENT TELEPHONE ASSOCIATION OF THE UNITED STATES OF AMERICA, AT CLEVELAND, OHIO, JUNE 12, 13 AND 14, 1900.

PROCEEDINGS OF EACH DAY'S SESSIONS—ADDRESS OF PRESIDENT THOMAS—PAPERS AND DISCUSSIONS—IMPORTANT BUSINESS TRANSACTED—THE SOCIAL SIDE OF THE CONVENTION—CONVENTION NOTES.

While the actual sessions of the fourth annual convention of the Independent Telephone Association of the United States of America did not begin until June 12, several preliminary committee meetings, having a direct bearing on the convention, were held Monday. The day was superb, such a June day as is frequently enjoyed in the beautiful city of Cleveland, and the great Electric Building, which, by the way, is one of the finest office buildings in the West, was alive with telephone manufacturers and business men, all intent upon making every preparation in advance for the meeting.

At noon the Ohio Telephone Association met in the Electric Building for the purpose of organizing to assist in the entertainment of the delegates and visitors. The meeting at once adjourned to reconvene at two o'clock, with Judge James M. Thomas in the chair. Numerous views were discussed and questions decided referring to the matters immediately before the association. The proceedings were not of a public character.

At eight o'clock P. M., on Monday, a meeting of the advisory board and the executive committee of the Independent Telephone Association of the United States of America was held at the headquarters of the association, in the Electric Building. These proceedings were also of a semi-private character, and several matters of detail concerning the programme, after discussion, were finally adjusted.

TUESDAY, JUNE 12.

The headquarters of the Independent Telephone Association of the United States of America, in the Electric Building, were opened at eight o'clock in the morning and from that time until noon were thronged with delegates and visitors who were required to register their names before receiving credentials. The names of 150 visitors and delegates had been received up to noon.

The convention was called to order in a room specially prepared for the occasion on the first floor of the Electric Building. President James M. Thomas occupied the chair and called the meeting to order at 12.15 P. M.

Secretary S. P. Sheerin was requested by the president to read the official call for the present convention. The secretary called the roll by states, to which about 50 responses were made. The roll-call, as read by the secretary, developed the fact that an unusually large number of independent telephone exchanges are located in Indiana and Ohio.

Mr. James B. Hoge read the address of welcome as follows and received much applause:

I think perhaps some excuse should be given for the change in programme which brings me before you to-day. The committee very much regret that the Honorable John Farley, Mayor of the city, is not able to appear before you and make a fitting address. The city of Cleveland is recognized as being a convention city and her people as being very hospitable, therefore, I have no fear of getting myself into trouble by extending to you a hearty welcome to the city. The thing that gives me assurance in making the welcome and the invitation so broad is the fact that the company which I have the honor of representing, has been able to put in successful operation a telephone plant in the city of Cleveland. The only excuse I can find for Father Moses Cleveland and his associates for encouraging the citizens to plant trees that grow higher, wider and deeper each year is to make myself believe that they never dreamed of telephone lines, trimming trees, etc., when they were writing the city's prospectus.

You will have a great amount of work to perform during the convention and it is perhaps useless to occupy more of your time, but I would advise getting together early, say ten o'clock, in order that we may have the afternoons and evenings for recreation, and I would follow the old adage, "Never do to-day what you can put off till to-morrow." We all know how well this rule works with the prospective telephone subscribers up to the time when they actually sign their contracts and how quickly they change the rule after the contract is once signed, wanting their telephone in working order before breakfast the next morning.

It is, however, my pleasant duty and hon or to represent the Cuyahoga Telephone Company and the United States Telephone Company this morning and to extend to each of you a welcome to our city, and to ask you to make our offices your home while in the city.

Our long-distance lines, reaching most points in the cities of Ohio, make connection with independent exchanges in the states of New York and Pennsylvania on the east Kentucky on the south, Indiana on the west, and Michigan on the north, and within the next few weeks we expect to be able to make connection on the south and east with West Virginia. We connect to-day with some 540 stations in Ohio, and with fully 37,500 telephones, and as I look into the many well-known faces before me I know that there are many additional subscribers being added each and every day, and I can not help but feel confident of the independent telephone companies' future. I think this is especially true as far as Ohio is concerned and many other states of the central West. If there are any delegates here who represent states that have not been so well organized and developed, I hope that before they leave this convention they will have received enough enthusiasm and interest in the matter to have resolved to return home and perfect an organization that will thoroughly develop their states, or at least have matters so well along that there will be no question of their future by the time this association meets at its fifth annual convention.

Judge Thomas responded to Mr. Hoge's address and extended every courtesy to the delegates and visitors which the city of Cleveland could furnish. He read the programme arranged for the meetings and urged the attending delegates and visitors to be promptly on hand at the appointed hour for each entertainment, and also said that the business meetings would be made as brief as possible in order that all the programme might be carried out.

The American Steel and Wire Company invited the delegates to visit its plant, at Cleveland, on Tuesday afternoon, special trolley cars being provided to take the delegates there.

The meeting adjourned at one o'clock P. M.

WEDNESDAY, JUNE 13.

The meeting opened at 10.20 A. M. with about 300 delegates and visitors present. Judge Thomas read his annual address. which was received with great applause:

PRESIDENT JAMES M. THOMAS'S ADDRESS.

Before entering upon the annual address proper, my duty and pleasure, as president of the Independent Telephone Association, is to acknowledge upon behalf of this organization the great assistance that has been rendered us by those who have taken more than a usual interest in the success of this meeting. The local press of the city of Cleveland, the electrical journals, both of New York and Chicago, and many of the newspapers throughout the country, have done us great service in bringing the convention to the notice of the public. More than 1,500 operating companies have complied with the request to furnish a detailed statement of their properties. Much assistance has been rendered by the manufacturers and supply companies, in our attempt to perfect the list of operating companies throughout the United States. We are under special financial obligations to the Cuyahoga Telephone Company, of the city of Cleveland, for its liberal donation of space in the Electric Building for this convention and the exhibits of manufacturers, which donation has furnished us a large source of revenue, and which will materially help to pay the expense of the entertainment of the delegates and visitors. We also acknowledge financial assistance from the Telephone, Telegraph and Cable Company of America in gathering information from the operating companies. To all these and the many other individuals and companies who have so kindly shown their good will by lending us their assistance, we return our sincere thanks.

To the local entertainment committee, composed of prominent citizens of Cleveland, representatives of manufacturers and

supply houses, who have worked under the guidance of Mr. C. W. Wason, of the Cuyahoga Telephone Company, we are indebted for the arrangement of the many pleasures which we will enjoy during this convention.

The annual address last year contained the following prophesy: "The coming year will be one of interest and importance for both sides." We are more or less aware how this prophesy has been fulfilled. It will not be possible in this short space of time to enumerate everything of interest that has occurred in the telephone world since our last annual meeting.

We find since that time that the entire property of the American Bell Telephone Company has passed into the hands of the American Telephone and Telegraph Company, and we are informed that the business formerly carried on from Boston will soon be removed to the city of New York.

Last year the Detroit Telephone Company had several representatives at our meeting. During the year their entire property has been transferred to the Erie Telephone Company, a licensee of the American Bell Company, together with the property of the New State Telephone Company, which owned toll lines in Michigan, connecting some of the independent exchanges with Detroit, owned by the same syndicate. At the same time their exchange at New Orleans was transferred to the Southern Bell Telephone Company.

Shortly after the purchase of the properties owned by this Detroit syndicate, by the Erie Telephone Company, it was announced that the Telephone, Telegraph and Cable Company of America, an independent organization, had purchased a controlling interest in all of the Erie properties, thus placing under the control of an independent organization the properties of the largest licensee of the American Bell Telephone Company.

The Massachusetts Telephone and Telegraph Company, of Boston, have been at work for some time constructing an opposition plant in the city of Boston, and have secured about 60 franchises in different cities and towns in Massachusettes after a hard struggle with the New England Telephone Company, and it is still at work in the good cause acquiring new franchises. There has been organized also what is known as the Boston & New York Telephone Company, which contemplates building long-distance lines between Boston and New York city.

The organization of the Telephone, Telegraph and Cable Company of America, with offices in the city of New York, has attracted more attention in the telephone world than any single organization during the past year.

There has been organized in the state of Pennsylvania the Interstate Telephone and Telegraph Company, a toll line company, with offices in the city of Philadelphia. This company is now building toll line connections between the independent exchanges of eastern Pennsylvania and New Jersey. There has also been organized in the city of Philadelphia the Keystone Telephone and Telegraph Company, which has recently been granted a franchise to build exchanges in the city of Philadelphia.

There has also been a recent organization in Virginia known as the Virginia Long-Distance Telephone Company, with offices at Fisherville, which contemplates building long-distance lines in that state. Also an organization at Cedar Rapids, Iowa, known as the Central Telephone and Telegraph Company, which has taken up the work in that state. It has already acquired property of other organizations which have been operating lines in that state.

There are many other similar organizations for toll line purposes throughout the country. Franchises have been granted in San Francisco, Kansas City, Scranton, Pa., and in a great many other cities throughout the country.

Many exchanges have opened for business since we met last year, among them Wilkesbarre, Pa.; Duluth, Minneapolis, St. Paul and many others.

The Columbus Citizens Telephone Company, of Columbus, Ohio, the Pittsburgh & Allegheny Telephone Company, of Pittsburgh, the Maryland Telephone Company, of Baltimore, and many smaller exchanges are now about ready to open for business, so without going further into detail, I think that all will agree that the advance in the past year has been both interesting and important.

There are not less than two and one-half million telephones in operation in the United States, counting both the Bell and the independent systems. We believe that the population of the United States will use 7,000,000 telephones at reasonable prices.

The Bell Telephone Company were nearly 20 years in creating a demand for 582,508 telephones. Since the beginning of the independent telephone movement, six years ago, nearly 2,000,000 telephones have been added to this number.

It will take at least $700,000,000 to install all the telephones that our present population requires. When we think of these possibilities, the broad expanse of territory, our great population, the almost incomprehensible number of dollars that it will take to supply a demand that can be created, we wonder how it is possible that men should take a narrow view of the subject, and allow themselves to waste their time and money in warfare over territorial division. There is ample territory for all, and certainly a place for every dollar there is to invest. What we need more than anything else at this time is good, clear, business judgment which will devote itself to this great work.

There is always room in any town or surrounding country for an independent telephone system, providing there is no company occupying that territory except a Bell licensee; but that no territory is large enough for two independent companies is a safe and simple rule to follow, and if followed will be for the good of the investor. I have never known two independent companies to enter the same territory without loss, but one as opposed to the Bell Company, though the Bell may give free service, always flourishes. Why? Because the policy of the independents being the same, injury is the natural result, while the old policy of the Bell companies in every instance assists the independents to a good and paying business.

It is not to be understood that the Bell licensees have not men in their ranks with ability and policy to successfully carry on their business to its fullest development. Such an inference would be a great mistake. Some of the sub-Bell companies are officered with men not only of large experience, but of great tact and ability. If they were not hampered by the short-sighted policy adopted in the beginning of the American Bell Telephone Company, their companies would have advanced to a position that would have been almost impregnable, before the independent telephone companies were permitted to enter the field by reason of the expiration of patents. Being burdened by exclusive, perpetual and exacting contracts, and in most parts under the direct control of the American Bell Company, which owns a controlling interest in their stocks, they are retarded, and the individuality of the officers and employees of the licensee companies counts for naught. The disposition of those most advanced, and especially the stock of whose companies are not controlled by the American Bell, is at present very manifest.

Can we not see in all the events now transpiring in the telephone world, "the dawn of the new day," and is it reasonable to suppose that history will not repeat itself, as it has in every line of business which was begun under the protecting care of our patent laws? Is not the independent telephone movement the beginning of a new, broader system of conveying intelligence by wire? Will not the same that has occurred in every other branch of business, that has evolved from a thing of convenience and luxury to a thing of necessity, be fully realized in years to come in this business?

The telephone business is not a natural monopoly. If it is, the resort to many fictitious patents was not necessary to the prolongation of the monopoly. Nature, and these patents combined have failed to continue the monopoly.

So long as telephones were kept beyond the reach of the great majority of the homes, stores, offices and factories of this country, the business could not exist as a natural monopoly, but only existed as a monopoly as long as the laws of this country said the products of the genius of man should be protected. No business has ever thrived long as a monopoly, without government protection, until by perfect organization the thing has been placed within the reach of the people at prices below those that could be made by opposing companies.

A minimum price to the consumer, and a full supply for the demand at that price, will naturally create a monopoly of that thing. It can not be accomplished in any other way. When a great organization can gain control of the business of conveying intelligence by wire, place it upon a basis of profit, at a minimum price, furnishing a sufficient supply for the demand, then it will be possible for the business to be controlled by one organization, but that can come only after full development under competition, such as is now afforded by the independent telephone movement. There is no more economical way to develop the telephone business than by competition.

All the wire, conduits, poles, switchboards and equipment, which may be installed will be required to carry on this business under this new demand. Besides, competition is necessary to train employees to properly carry on the work, and such training as is given under competition is necessary to develop the employees themselves for the greatest possibilities. In this way, men in charge of the offices of the companies are compelled to study the needs of the people, and devise ways to supply the demand after they have induced the people to use that which they so much need in their business and social affairs. This result can not be obtained in any other way than through competition.

We are told constantly that two telephone companies in the same town are a nuisance; that people do not want competition. I have never heard business men who had use for two telephones talk that way. This talk is generally from the stockholders and officers of the first company on the ground.

The man who only has use for one telephone of course does not need two, but every man needs at least one in his home and one in his business. Some need more than one in their residence, and many need two in their business; others more than two, while the large business houses in all the cities, hotels and factories need a complete system of many telephones in order to facilitate their business.

This demand is growing every day, and, as the new demand under the new policy which has been established by the independents is fully supplied in the different communities, the number of users has multiplied four or five times, and the capacity of one telephone can not properly handle the business. Then we find business houses that had little use for one telephone before, anxious for two or more. When two or more are required, and there are two good systems in the town, it is policy to be connected with both, so that this business may be reached by all the different users in the community.

When we consider the value of the telephone in the business and social world, it seems strange that the growth of the business should be retarded longer by the selfish policy of the grasping, dominating corporation.

Why not put the business upon a more business-like basis, considering all its great possibilities, affording means of bringing people closer together, facilitating business, and at the same time being a great source of economy for the users; the fact that it presents to the investor something more safe and more lasting that the securities offered by transportation companies, makes it im-

possible for any corporation to curb and check the onward progress of the telephone.

There is no business that promises a greater reward and a more safe and enduring investment. Men are just beginning to comprehend its possibilities. What can be more useful in the great social and commercial world than the business that conveys your thoughts to another instantly and presents to you at once the thought of the person with whom you communicate? And what can be more desired than that means which reproduces in your ear the exact tones and inflections of the voice of the person with whom you converse?

We all remember how wonderful it seemed when we first heard of the experiments of the inventors of the telephone. We marveled and doubted the possibilities of the conveyance of the human voice over a wire, but it was perfected, and has now gained its place as one of the necessary things, whereas, for some time after its invention it was exploited only as a means of entertainment and amusement. The people were not unmindful of that which is due to the man of genius who invented and perfected this wonderful instrument, and all the essential apparatus necessary to put it into commercial use. They waited patiently until the reward that our wise government gives inventors had been fully paid.

The people have demanded that their natural rights be restored to them, and that the owners of these expired patents shall no longer retain a monopoly of that which is so useful and necessary, over which they had exclusive control by reason of our patent laws. The independent telephone men of the country have been entrusted with the important work of giving this invention back to the people. How well that work has been done up to the present time can only be known by a careful study of the development that has followed the organization of the work.

It is hard to comprehend that in this short time more than 3,000 independent telephone exchanges have been put into operation, and that nearly 1,000,000 telephones are now operated by independent telephone companies. But we are not yet satisfied. This work must go on. A great intelligent organization must furnish means and devise ways of carrying on this work to its full accomplishment. This new organization will furnish a grand field for investors, and will certainly triumph in having solved the greatest commercial problem ever presented to man.

The old policy and the old agreements which have retarded this business will then have passed into history as mistakes made by those who had great opportunities.

When we consider the many things necessary to bring about this desired effect, we find it impossible to embody in this address even the most important ones. Only a few can be noticed. In the first place to give the greatest number advantages of the telephone measured service presents itself as the most practical means. It is not an easy method to put into practice, but I believe is one of the essentials of full developments. This gives to anyone such service as his demands require, at a price commensurate with the service. This is necessary, especially in the larger cities, where the very extremes of service are demanded. Because there we find the small user, who for his limited wants needs the telephone, while the man of large affairs needs an unlimited service, employing many telephones and a great many people to operate the same. In these extreme cases the demand for measured service is too apparent to admit of controversy.

Party line service has come into use by the Bell companies as a means of giving lower prices to those who will not pay the independent prices for exclusive service. Experience has taught us that this is an excellent means of teaching the people the uses of the telephone. When they have learned its uses and feel the necessity of making it a permanent part of the home or business, they take exclusive lines from the independent companies. For this help we feel grateful, and while we do not condemn the use of party lines of the Bell Company, we advise the independents to hold to the idea of exclusive circuits at their established prices, rather than reduce their prices by giving party line service in order to meet competition. The best service is none too good. Therefore, always give the best.

If your construction and apparatus is inferior, true business principles demand that you improve your property.

If your employees are incompetent or neglectful, apply the same sense you employ in the business that you have made successful, by replacing them. If they are not mindful of the rights of other companies, with whom you have contracts, tell them that they are not honest in carrying out your obligations, therefore, their services are dispensed with.

If your manufacturer insists in selling you inferior apparatus or material, buy of someone who is prepared to give you what your business demands. Let your manufacturer know that you are willing to pay good prices for good material, and that you do not want poor apparatus or poor material at any price. The question of the operation of telephone properties is one full of problems. No matter how perfect your equipment, you can not get good service without proper organization of your working force.

You must have a good practical manager, with good common sense, and enough technical knowledge to understand the essentials of good service. Your electrician must be a thoroughly practical man who knows the theory of the operation of the switchboard and telephones.

Your operators must be quick, pleasing and willing to help build up and retain your business. They should be ladies and treated as such. The manager should not be permitted to quarrel with them or correct them in the switchboard room. He should not be permitted to quarrel with them at all, but when reproof is necessary, or instructions needed, he should talk kindly about their faults, when no one else is present.

Users of telephones must not forget they have their duties in creating good service. When there is a call, it is your duty to answer, and when you call, you should be polite and gentle with the operator.

The gentle kind voice through the telephone is always pleasing to the receiver. A gruff, angry voice is equally displeasing. Users should remember that the person receiving the message, forms his estimate of the character of the sender from the tone and manner of the conversation.

The uniting of properties of different companies for the purpose of completing larger systems for long-distance toll service presents the most difficult problem to the independent telephone investors. How to give good toll service over long lines, owned by different companies at reasonable prices is a question requiring considerable attention. All will admit that in order to give good service the character of construction must be the same throughout; and in order to give this service at reasonable prices the business must be handled economically; and in order to meet the demands of the public the service must be prompt.

Now, to accomplish these three essentials, I think we will all agree that there must be a general head having absolute control of this interchange business, under whose direction the different companies must act. This general head must have power not only to manage and control interchanged business, but should have the power to collect the revenues therefrom and make general settlements with the companies whose property is involved.

This problem is not new. It has been successfully solved by the railroad companies, by forming passenger and freight associations, which control the business passing over the lines of several companies. This has been found both economical and effective.

While the telephone business is not similar in all respects to that of the railroads, we believe that an association composed of the different companies, desiring to enter the same system, organized under a proper agreement, rules and regulations, will adjust and operate these properties and make settlements among the companies by means of a clearing house with facility and economy; and that such an organization will be able to give good service to the public and satisfactory returns to the companies whose properties have been placed in the general system. This organization, which we will call a traffic association, should have power to issue a general coupon, good on all the lines of the system, sold at the usual rates of discount. It should also have charge of all franks, and have power to issue and refuse the same. It should spend much time in devising new means of getting business, and inducing large users to take exclusive circuits.

In such an organization will be found a solution for the problem of handling interchange business, which has been very perplexing to many companies.

In such an organization as this will also be found the bond that will cement the various telephone interests together, by affording increased revenues, thus creating a general united interest.

This central power would lead not only to a stronger bond of union, but would promote better development in the many communities, and would result in well-defined territorial limits which would be conceded to the toll line company occupying that territory.

Territorial limits should be fixed for toll line companies in most instances by state lines, but in some instances great physical lines are more natural, such as mountain chains, or deserts, and in others, great commercial centres will naturally require contiguous territory. This central power would place us upon an equal footing with the other companies engaged in rapid communication by wire. Then, with the advantage enjoyed by no other companies in this business afforded us by local interest, we become stronger than any and all others combined Then we can rest assured that the changes that the future may bring forth will not leave us without power.

If the conveyance of intelligence by wire is to be owned and controlled by one organization, let it be under the policy adopted by the independent telepnone men of this country. Under this policy has been the greatest advancement, though only six years have elapsed since its adoption. Upon this rock can be built the greatest commercial structure, under the greatest organization the world has ever known. It will be grand and enduring, and more than gratifying to its owners and builders.

Mr. C. W. Wason, chairman of the entertainment committee, made several announcements with regard to the entertainment programme.

Mr. J. B. Ware, general manager of the Citizens' Telephone Company, of Grand Rapids, Mich., then read his paper, entitled "Toll Line Traffic." He said toll line business was always larger than was anticipated, and there were no instances on record where toll business has not proven a good investment. The basis of settlement of toll rates when two or more companies are interested is a difficult problem. He thought that air line distances ought to control toll rates between points more than fifty miles apart. Inside this limit local rates should be obtained. The unit of time for a conversation should be three minutes. A clearing house should be established to settle toll fees and the company of origin should have a 15 per cent com-

mission when the message comes in at a toll station, and 25 per cent when it originates in an exchange net work. A clearing house in each state might handle the settlements for messages over three or more lines, while those on two lines should be directly handled by the companies interested. The author considered the government war tax of one cent on messages as directly inimical to independent companies, and in the interest of the Bell Company, which charges large sums for very long-distance conversations as against the small fees for many short-distance conversations on independent lines. He urged some action for the repeal of the war tax on messages.

Considerable discussion ensued on the question of charging up toll messages between toll companies, upon an actual mileage basis. Mr. Ware admitted that the percentage basis as at present in use, was only a makeshift, satisfactory for the present business, but that some better arrangement would have to be made as the long-distance independent telephone lines increase. Mr. McFarland, a delegate, took up the question and announced that he was an advocate of a clearing house for telephone toll business. Mr. Ware discussed the question with great ability, and offered many valuable suggestions, all of which were received with great enthusiasm by the delegates attending. Mr. Ware showed himself to be a careful student of the telephone business. He said that the toll line agent is in the same position as a Sunday-school teacher. He never has and never will receive proper financial reimbursement for his actual work. Mr. Ware strongly urged the building of long-distance toll lines, whether immediately profitable to existing exchanges or not.

A paper on "Telephone Development" was read by Mr. Edward L. Barber, and was received with frequent bursts of applause. It will appear later in the ELECTRICAL REVIEW.

Mr. Clark wanted to know what could be done by the association for the rural users of the telephone, and said that every farmer ought to have a telephone just as much as a sewing machine. The president said that this matter would be taken up before the convention adjourned.

The Honorable Hugh Daugherty, president of the United Telephone and Telegraph Company, of Bluffton, Ind., prefaced his address by stating the difficulties he had encountered in securing proper statistice for comparison, and then corrected the title of his address to "Independent Telephone Investments." No discussion followed the reading of Mr. Daugherty's address. This paper was one of the most interesting presented at the convention. It began with a consideration of the place of the telephone among the world's needs, and showed that it was now an indispensable necessity. The rates charged for exchange and toll line service, according to Mr. Daugherty, can not be made arbitrary; they must be made to fit local conditions. The small town exchange will be managed by local people, and is an important feeder to the general system which must come sooner or later, connecting various towns of a state or section together. The greatest mistake in independent telephony so far has been bad construction. All the important patents have now expired and as good or better equipment than that of the Bell companies can now be had. All plans for lines or exchanges should be made for twice the capacity expected. The speaker drew a parallel between the business of a large Bell licensee company and independent companies in the same district. Six years ago there was not an independent telephone exchange in Ohio, Indiana or Illinois. Now there are 217 companies operating 321 exchanges with an aggregate of 47,000 subscribers, and 8,500 miles of toll line in Ohio alone. In the three states mentioned there are 733 exchanges, 102,000 subscribers, and 21,500 miles of wire in toll lines, which greatly exceeds the Bell companies' business in the same territory, though it had been located there 14 years before the independents began. The conclusion drawn was that no enterprise or property of any kind seems so attractive to capital or so safe an investment as independent telephone securities.

Mr. C. W. Kline, president Interstate Telephone and Telegraph Company, Philadelphia, then addressed the assembly on "Our Duty to One Another," and received applause. He said that the history of the introduction of the telephone was marked by a gradual growth of appreciation of the instrument as a convenience, then as a necessity. The business world had striven for a long time unsuccessfully to secure equitable rates for the use of the instruments, but the corporation exclusively in control had not realized that it should meet this demand, and had antagonized the public. Hence at the earliest opportunity the independent companies arose. Their first and paramount duty is to stand by one another. Mr. Kline gave an interesting account of legal proceedings brought against a small company in Pennsylvania, which was defended by the Independent Telephone Association. All independent companies, he said, should join the association. They should not infringe on one another's territory, and they should pool their interests as far as possible.

In the absence of Mr. James E. Stewart, chief engineer of the Telephone, Telegraph and Cable Company of America, his paper on "Telephone Construction" was read by Mr. Van Nostrand. It will appear in full next week.

Mr. Sheerin, secretary of the association, then moved a vote of thanks to the author of each paper, which was unanimously passed.

President Thomas suggested that the delegates from the several state associations convene before the next morning for the purpose of selecting a member of the executive committee for the ensuing year, and 2.30 P. M., was set for this purpose. The meeting adjourned at 1 o'clock P. M.

THURSDAY, JUNE 14.

The meeting was called to order by President James M. Thomas at 10.30 o'clock. The secretary then read an invitation from the authorities of the Pan-American Exposition for the convention to be held at Buffalo during the time of the exposition next Summer. Similar invitations were read from the city of Niagara Falls and from Saratoga Springs. These were all referred to the executive committee. The president then called for the reports of the various officers, and himself made a brief oral report of his work during the past year.

Incident to this convention President Thomas said his office had handled 18,000 pieces of mail matter. He had detected great increase of interest in the association from all quarters and all classes of people whether affiliated with it or not. Reports had been received from independent companies in 44 states and territories. Nowhere else was the growth more remarkable than in the Southern states. Independent companies in Alaska had already made reports to him, and he was deeply impressed with the vigorous and satisfactory way in which the independent organizations had gone to work. At its beginning the Bell Company had started in the largest cities and very slowly worked its way into the smaller cities, then the towns and villages. The independents had started with the little towns and slowly worked their way up to the larger cities, now having exchanges in many cities of the first and second class. During the ensuing year a great volume of valuable information collected by independent telephone organizations will be available for investors. The president's remarks were received with applause.

The secretary then called the roll, and the state organizations nominated the following committee: W. W. Tobie, Illinois; L. A. Frazee, Indiana; W. H. Durin, Iowa; W. B. Seaton, Kentucky; J. B. Ware, Michigan; W. S. Eckert, New York; E. L. Barber, Ohio; S. E. Wayland, Pennsylvania; C. E. McCluer, Virginia; John H. Grogg, West Virginia, and Richard Valentine, Wisconsin. The new officers were empowered to fill all vacancies in the above committee.

It was decided to hold an executive committee meeting on the boat during the afternoon. This boat was furnished by the courtesy of the Cleveland & Buffalo Transit Company, which entertained the delegates and visitors during the afternoon by a ride around the lake near the city.

The Hon. E. B. Fisher made a brief report from the committee on new members. Mr. Park, of Saginaw, Mich., spoke at length regarding his disappointment at the lack of practical discussions at the meeting. Hon. S. B. Sheerin presented the treasurer's and secretary's reports. "The membership of the association in 1899," he said, "was 119 and is now 140."

At this point President Thomas was excused, and Hon. E. B. Fisher took the chair, and, under a suspension of the

rules, the election of new officers was held. Judge James M. Thomas was reelected president by acclamation. The other officers elected were as follows:

First vice-president, H. C. Young, Columbia, Pa.; second vice-president, C. E. Stinson, Rochester, N. Y.; third vice-president, H. E. Eachoud, Des Moines, Iowa; secretary and treasurer, S. P. Sheerin, Indianapolis, Ind.; first assistant secretary, R. F. Johnson, Saginaw, Mich.; second assistant secretary, S. E. Wayland, Wilkesbarre, Pa.

After a brief discussion of unfinished business several of the delegates gave practical talks, and the convention then adjourned to meet on the boat at two o'clock. The boat ride was greatly enjoyed.

In the evening at eight o'clock a banquet was held at the Colonial Hotel and was attended by nearly three hundred members and visitors. Hon. H. D. Critchfield, general counsel of the United States Telephone Company, was toastmaster, and, with the singing of Auld Lang Syne at midnight, the most enjoyable and important convention in the history of the association passed into history.

full operation, received the highest praises. The new North desk telephone also came in for a liberal share of praise, it being small and neat in appearance and free of exposed connection ends. The private branch exchange for use in office buildings and large business houses in the larger

EXHIBIT OF THE WILLIAMS-ABBOTT ELECTRIC COMPANY AT THE CLEVELAND TELEPHONE CONVENTION.

cities was neat in design and called forth unstinted praise from those who inspected it. Several new designs in cabinet telephones, wall instruments, etc., were also displayed. The 10-line toll board, having different-toned bells for each line received

Electric Equipment of the New York Elevated Railways.

At a meeting of the executive committee of the Manhattan Elevated Railway system, in New York, on June 12, contracts were awarded for machinery and buildings which will practically complete the proposed central power station at the foot of East Seventy-fourth street, in New York city. The contract for the stationary electric plant was awarded to the Westinghouse Electric and Manufacturing Company, of Pittsburgh. Contracts for 64,000 horse-power of boilers were awarded to the Babcock & Wilcox Company, of New York; the contracts for the engines having already gone to the E. P. Allis Company, of Milwaukee. Messrs. Post & McCord will erect the structural work of the building. It is stated by President George J. Gould, after the meeting, that the contracts so far awarded involved about $5,000,000, and that electric trains would probably begin to run in February, 1901.

It was decided at the meeting to equip the trains with a motor car at each end, each car having four motors. The contracts have also been let for continuously moving inclined planes or moving staircases to be located at Third avenue and Fifty-ninth street, and Sixth avenue and Twenty-third street. It is expected to test these devices in actual practice before extending their use to other stations in the system. Work on the foundations of the power-house is completed and the buildings will soon be ready for the machinery, which will begin to arrive in September.

TWO VIEWS IN THE EXHIBIT OF THE NORTH ELECTRIC COMPANY AT THE CLEVELAND TELEPHONE CONVENTION—DECORATION BY WILLIAM L. OTIS.

The North Electric Company's Cleveland Exhibit.

The North Electric Company, of Cleveland, Ohio, "sprung" several new features in its exhibit at the convention, and as a result its beautiful room, decorated with palms, cut flowers and bunting, was one of the most popular centres of interest. Its principal feature was a working exchange of its new supervisory telephone system, having private lines to the company's offices and factory, and to different parts of its exhibit. An obliging and competent operator in charge of the ward was an effective attraction, giving the delegates an opportunity to watch the practical operation of the system. This test was made under the severest of actual service conditions. The power generator, direct-connected with the motor and in especial attention from all interested in this class of equipment. This attractive exhibit was well filled all the time, and every visitor left with beautifully designed buttons and souvenir booklets in the shape of a guide to the city, entitled "Where to go, and how to get there." The special printed matter issued by the North Electric Company were beautiful examples of the printers' art, and were sought by every one. The factory and offices in Frankfort street were also thrown open to the visitors and many availed themselves of the opportunity of inspecting the methods of manufacture adopted by this popular company. The exhibit was in charge of F. F. Sapp, manager of sales and advertising department, J. P. Downs, engineer, and Dudley Wick, head of the drafting department. The president, Mr. C. H. North, and Mr. George C. Sterk, secretary and treasurer, divided their time between their offices and the exhibit.

A New Telephone Manufacturing Company.

The Keelyn Telephone Manufacturing Company was recently incorporated under the laws of the state of Illinois, and the management of its business is in the hands of Mr. J. E. Keelyn, formerly president of the Western Telephone Construction Company. It is capitalized at $200,000, and is reported to be backed by capitalists of good financial standing.

Mr. Keelyn is known as one of the fathers of independent telephony. His many friends will be pleased to learn of his new enterprise, which is an assurance that he will continue prominent in the field.

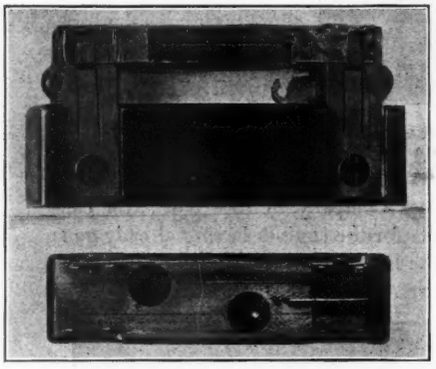


FIG. 2.—COMBINED FUSE AND LIGHTNING ARRESTER—ACTUAL SIZE.

The Keelyn Telephone Manufacturing Company will make a full line of telephone apparatus and will offer some new telephone specialties. A high grade of apparatus will be adhered to. Some of the standard types of instruments are illustrated herewith, being those exhibited at the Cleveland convention. The Keelyn exchange and long-distance instrument is of the series type, with 80 ohms resistance in the pair of ringer coils; a heavy three or four-bar magnet generator with high efficiency armatures capable of ringing strongly through 25,000 ohms of resistance. The switch hook is of the long lever, cast-brass type, with strong steel spring, and German silver circuit springs provided with platinum contacts. Wide gears and an automatic cutout operated by the crank are provided. The binding posts are of the lock-nut type, while the wiring and workmanship are neatly done; all being mounted in a highly polished, French finish, hardwood case of quartered oak or walnut. All exposed parts are in fine nickel finish.

The Keelyn transmitter is claimed to be of exceptional simplicity and efficiency. The transmitter cup or box is cast in one piece on the arm, to which cup is screwed the cast-brass, nickeled cap. This cup and cap enclose simply a diaphragm, granular carbon in a loose or free state (being one-half full), a thick carbon disk, which latter is screwed over a mica disk against the enameled back of the cup by a plated machine screw which passes through a hard rubber bushing and is connected to one terminal lock-nut binding-post; the other circuit leading through the arm to the induction coil. The arm is of the "rocker" type, mounted on the induction coil base, the whole being enameled and neatly decorated. The induction coil (like all Keelyn coils) are of the full silk-wound copper wire type; being quite long, with a heavy Swedish iron wire core. The primary is .75 ohms and the secondary 75 ohms resistance, which Mr. Keelyn claims to be proper for two-cell battery.

Among the specialties is the new Keelyn combined carbon and fuse lightning arrester. This shows to what extent improvement can be made. The most popular type heretofore made occupies a space two by seven inches, while the new Keelyn type only occupies a space of two by one-half inches, or one-fourteenth as much! It is fitted with German silver spring-standards for holding the carbon and fuses, each standard being provided with an "eye" for soldering in the wires, making a certain connection.

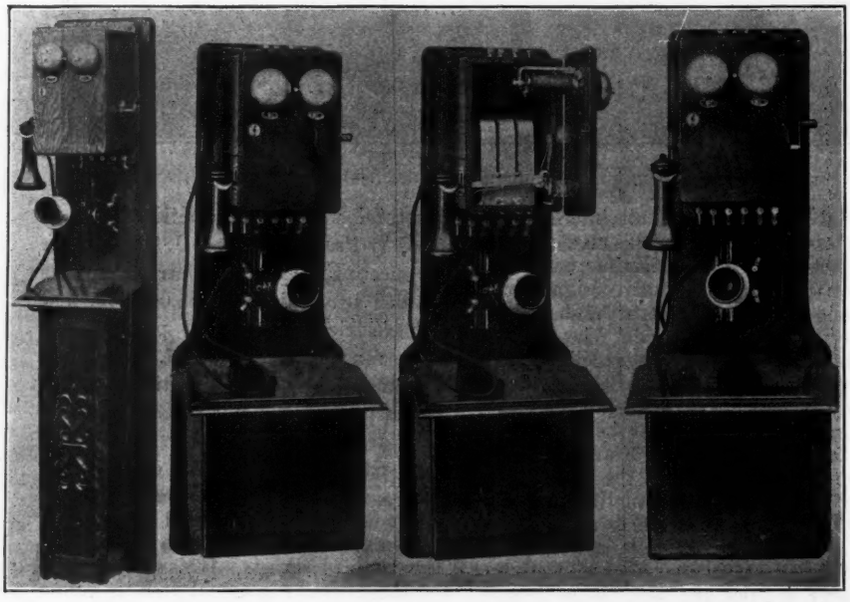


FIG. 1.—VARIOUS TYPES OF EXCHANGE AND LONG-DISTANCE TELEPHONES.

TELEPHONE CONVENTION NOTES

Mr. Wylie Brown, of the Bridgeport Brass Company, 19 Murray street, New York, was established at the Hollenden Hotel.

Mr. M. M. Hayden, the well-known carbon expert, of Ravenna, Ohio, was on hand and renewed many old acquaintances.

Mr. Philip H. Hover represented the New York Insulated Wire Company, of New York city, and made his headquarters at the Hollenden Hotel.

The American Toll Telephone Company, of Cleveland, handed to its friends a very neat aluminum match safe, which was received with due appreciation.

The Swedish-American Telephone Company, of Chicago, issued a poster sheet showing in pictorial form a few of its many developments in telephonic apparatus.

Mr. W. W. Low, of the Electric Appliance Company, Chicago, arrived on a special train from that city Tuesday morning and renewed many old acquaintances.

Mr. Hipwell, of the Hipwell Manufacturing Company, of Allegheny, Pa., was on hand and remarked that his concern was rushed with orders for telephones and telephone parts.

The American Steel and Wire Company had an exhibit of a number of sizes and grades of telephone and telegraph wires, and various specimens of many kinds of products produced by this company.

Mr. Chas. E. Brown, treasurer of the Central Electric Company, of Chicago, arrived on Tuesday morning with the Chicago delegates and met many old friends, both at the Hollenden and Colonial hotels.

The Nungesser Battery Company, Cleveland, had an uniquely arranged exhibit of Nungesser dry batteries used in telephone work; an artistic pyramid showing all sizes of these batteries, had been built.

Mr. W. D. Eckert, of the Telephone, Telegraph and Cable Company of America, of New York, arrived on Tuesday, renewing many old acquaintances as well as making new ones among the independent telephone men.

The North Electric Company, of Cleveland, issued a neatly arranged local guide which, besides explaining to its friends the merits of its telephone apparatus, gave proper directions for finding one's way about town. The booklets were in large demand.

The Okonite Company, of New York city, the well-known manufacturer of insulated wire, was represented by its general superintendent, Mr. George T. Manson. Mr. Manson had with him, as a

souvenir, one that was made in Madison, Wis.

Mr. Charles L. Burlingham, of the McDermid Manufacturing Company, of Chicago, was in demand at all times among his many friends, not only for the sake of hearing the many advantages of his concern's products, but for his charming personality as well.

Mr. George T. Manson, of the Okonite Company, Limited, New York city, arrived on Wednesday and put up at the Hollenden. Many appreciative comments as to the value of Okonite insulation for telephone work were poured into Mr. Manson's willing ears.

The Eureka Electric Company, of Chicago, handed to its friends a very neat badge carrying its well-known trade-mark of the Greek cross, and showing in a quiet and refined way that the independent telephone companies supply local and long-distance telephone service.

change managers. Mr. Seeley's company made no exhibit, but he reports that his company is working overtime to fill orders already on its books.

Mr. Robert McOuat, dealer in electrical supplies, Indianapolis, Ind., was present in person, and also Mr. Grace, of the same company, as well as several other representatives. This company carries in stock, in the Indianapolis store, a complete line of telephones, switchboards, line construction material and general electrical supplies.

Mr. Burt Hubbell, formerly of the Keystone Electric Telephone Company, of Pittsburgh, Pa., has organized the Century Telephone Construction Company, at 268 Erie street, Cleveland. This concern makes telephones, switchboards and telephone appliances. They also make a specialty of hotel and interior telephone plants.

The Williams-Abbott Electric Company, Cleveland, had an exhibition of exchange instruments which this company is introducing; also the standard Williams-Abbott magneto, and a new type of desk telephone sets, and repeating coils of new design. Mr. L. Sands, president of the company, was present much of the time.

The McIntosh-Huntington Company, Cleveland, has entered the telephone and telephone supply field, and hereafter will carry a general line of telephone and construction material. This company made an exhibit of telephone material, such as brackets, pins, insulators, etc., also complete switchboard apparatus, desk sets, etc. The exhibit was in charge of Mr. Siler.

Mr. Fred De Land, president of the Federal Telephone Company, Pittsburgh, Pa., was present and renewed many acquaintances among the telephone men. The Federal Telephone Company has acquired about 60 telephone plants in the vicinity of Pittsburgh and through Mr. De Land's efforts will, without doubt, secure several more as the result of his presence at the convention.

The Warner Electric Company, Muncie, Ind., was represented by its president, Mr. W. F. Warner. This company exhibited the newest form of the Warner pole-changer. This device is now being adopted by many telephone exchanges and

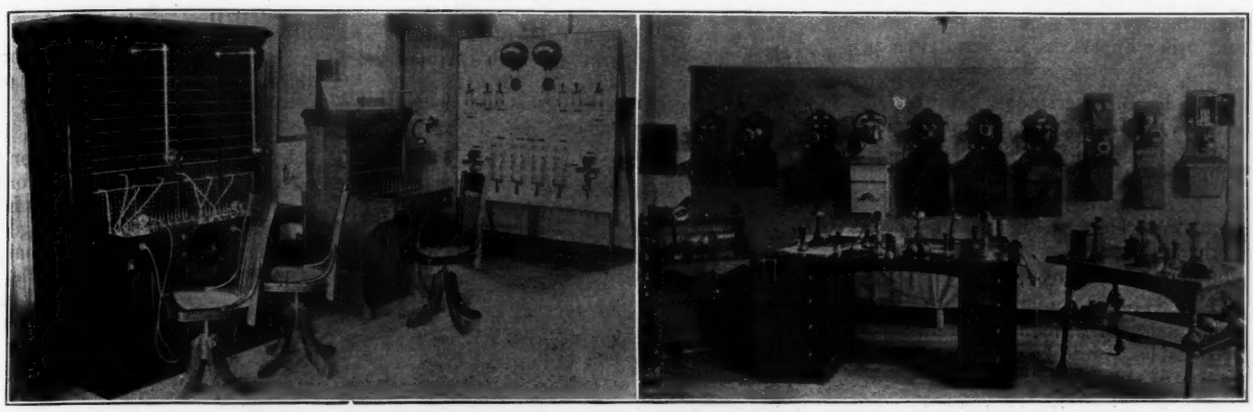


Exhibit of the Kellogg Switchboard and Supply Company. Exhibit of the Swedish-American Telephone Company.

Telephone Exhibits at the Cleveland Convention, June 12, 13 and 14, 1900.

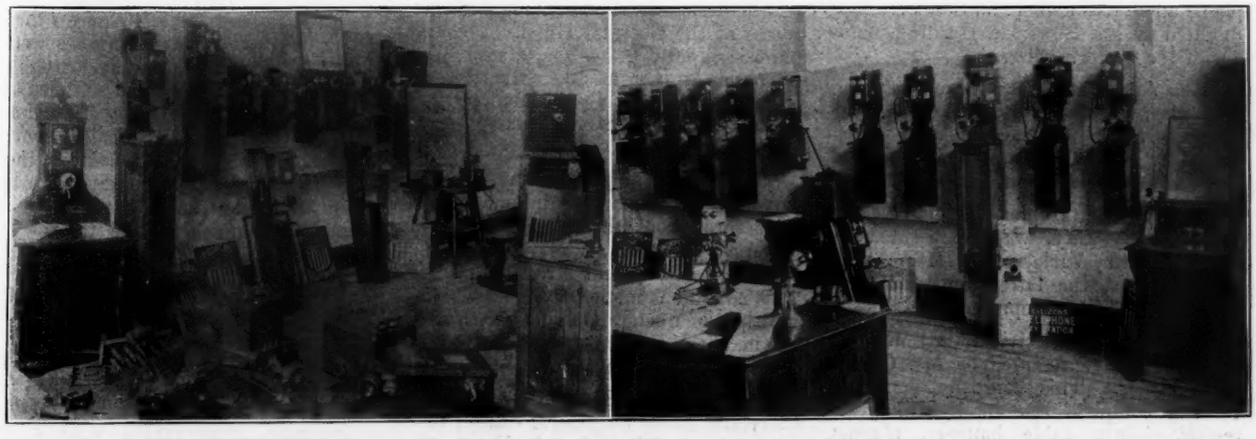


Exhibit of the American Electric Telephone Company—Central Energy System. Exhibit of the American Electric Telephone Company—Exchange Instruments.

Telephone Exhibits at the Cleveland Convention, June 12, 13 and 14, 1900.

Mr. John T. McRoy, of New York and Chicago, made an effective showing of the McRoy underground conduits, by placing samples of the conduits in gangs in several parts of the Electric Building, very effectively showing the advantages and value of his underground material.

Mr. E. B. Seeley, of the Couch & Seeley Company, Boston, made his headquarters at the Hollenden Hotel and formed many acquaintances among the telephone ex-

it is claimed that the telephone signaling power may be obtained with less trouble and at less expense than by the usual form of generators.

Mr. Geo. L. Wiley, New York manager for the Standard Underground Cable Company, of Pittsburgh, Pa., arrived on Tuesday morning and discovered that he had become twins and had distributed himself between two hotels. With Mr. Wiley's accustomed *sang froid,* it took but

a few minutes to get himself multiplied by two and made into one and to take headquarters at the Colonial, where he from that time held forth.

The Avery Stamping Company, Cleveland, was one of the exhibitors.

The American Electric Wire Company, Chicago, was represented by F. C. Bay, treasurer.

Mr. Loron Mitchell, Portsmouth, Ohio, manufacturer of insulators, pins, brackets and other apparatus in wood, was present.

Mr. E. B. Overshiner, president, and Mr. W. R. Lowe were present in the interests of the Swedish-American Telephone Company, of Chicago.

Messrs. Stromberg and Schaefer, of Chicago, were both present in the interests of the Stromberg-Carlson Telephone Manufacturing Company.

The National India-Rubber Company, Providence, R. I., manufacturers of wires and cables, were represented by Mr. Lyons, of the Chicago office.

The American Vitrified Conduit Company, New York, had excellent specimens of underground conduits as used in telephone systems, on exhibition.

The original Berliner transmitter model was placed on exhibition at the Colonial Hotel and because of its historic interest many enjoyed studying the first construction.

The Electrical Construction Supply Company, Springfield, Ohio, was represented by J. D. Rogers. This company had an exhibition of line construction specialties.

The Holtzer-Cabot Electric Company, manufacturers of all characters of telephone apparatus and specialties, were represented by Mr. Edwin R. Harding, manger of the western office.

The American Clay Manufacturing Company, Akron, Ohio, maker of clay conduits for telephone wire, was represented by Mr. H. Thompson, manager of the conduit department.

The Varley Duplex Magnet Company, Jersey City, was represented by Mr. Richard Varley and Mr. James Mason Knox, the latter gentleman the company's Chicago representative.

The American Electric Fuse Company, Chicago, was represented by Mr. George W. Conover. This company manufactures a complete line of lightning arresters, joints, cable hangers, magnet wires and telephone electric specialties.

Tuesday afternoon was devoted by the delegates and visitors to an inspection and examination of the exhibits of telephones and material on the first, second and third floors of the Electric Building. These exhibits are described and illustrated in this issue.

Leschen-Macomber-Whyte Company, Chicago, were represented by Mr. Whyte. This company had an exhibition covering telephone wires and line construction specialties, such as cable hangers, messenger pole clamps, clips, oval wire rope thimbles, guy clamps, etc.

The Sterling Electric Company, La Fayette, Ind., had a most interesting and complete exhibition of the Sterling switchboards, exchange instruments and Sterling apparatus. The company was represented by W. E. Doolittle, Mr. F. B. Cook and Mr. F. R. Rotcha.

The Victor Telephone Works, Chicago, made a complete exhibition of the well-known Victor apparatus, which included an elaborate display, at the Colonial Hotel, of switchboards, exchange instruments, desk sets, etc. Mr. James S. Healey represented the company.

The Farr Telephone and Construction Company, Chicago, was represented by Mr. C. W. Farr, president. This company has had an extra busy season, and for this reason only exhibited samples of the standard exchange instruments and a few specialties of particular interest.

Exhibit of the Sterling Electric Company at the Cleveland Telephone Convention.

B. F. Stewart, 253-255 South Canal street, Chicago, made an exhibition of telephones, and switchboard apparatus, in rooms at the Colonial Hotel. This company is rapidly developing a new line of telephone apparatus and is actively entering the field as a prominent manufacturer. Mr. B. F. Stewart was present in person.

The H. B. Camp Company, manufacturers of the Camp conduits, which are used throughout the telephone field for underground wires, was represented by Mr. H. P. Camp and Mr. A. L. Daniels. This conduit is made in various sizes and multiple of ducts and is laid with a patent mandrel which, it is claimed, will insure perfect alignment.

The Williams Electric Company, of Cleveland, made no general exhibit in the convention building, but during the days of the convention the company established a cab service between the Electric Building and its shops and invited all the visitors who cared to call to inspect its factory. Mr. Williams and several other gentlemen of the company were active in extending hospitalities.

General C. H. Barney, assistant manager of the Monarch Fire Appliance Company, of New York, manufacturers of the well-known "Kilfyre" fire extinguisher, arrived at the convention on Monday, and at once established headquarters. This fire extinguisher being in the form of a dry powder is especially valuable to telephone men, many of whom have had bitter experience with the effects of water on switchboard fires.

The Butler-Taylor Company, Ravenna, Ohio, were represented by Mr. Butler, who was not able to be present until the second day of the convention. This company manufactures a lightning arrester which is being widely adopted by telephone exchanges for switchboard protection. The arrester is automatic in operation, requiring no attention after being installed.

A delegate who arrived about noon from New York, on Tuesday, went from the train to a carriage at the depot. He observed a line of about 40 carriages and cabs and informed the man in charge of the carriage stand that he was the only delegate on that train, and that some one had made a mistake in having so many carriages to meet the train. The man in charge at once replied that the vehicles in line were not for delegates but that they formed part of a funeral, and that the corpse had just been put aboard the train upon which the delegate arrived.

The North Electric Company, of Cleveland, had particularly artistic effects in the interior decorations of its exhibit. In this case the officers of the company were fortunate in securing the assistance of the decorating house of Wm. L. Otis, Cleveland, and the result was an unusually effective and attractive room for the reception of guests. The hangings were harmonious in the selection, rich rugs placed on the floor, and the light softened by silken curtains. Potted ferns and palms were grouped. The ladies of the convention were particularly enthusiastic in their appreciation of this company's efforts, and this exhibition was thronged by social gatherings much of the time.

Mr. James E. Keelyn, the well-known Chicago telephone manufacturer, put in an appearance on Monday and established himself at the Colonial Hotel. Mr. Keelyn's many friends were interested in the announcement that he had just formed the Keelyn Telephone Manufacturing Company, incorporated with a capital stock of $200,000. The company's general offices are at 368 Dearborn street, Chicago, and it proposes to make telephones and telephone appliances for every service. A new and very compact device which this company will make is the "Keelyn" combined fuse and lightning arrester. This is a remarkably neat and condensed form of an important piece of apparatus, which occupies but about one-tenth the space usually taken up by such devices. Another specialty which the Keelyn Telephone Manufacturing Com-

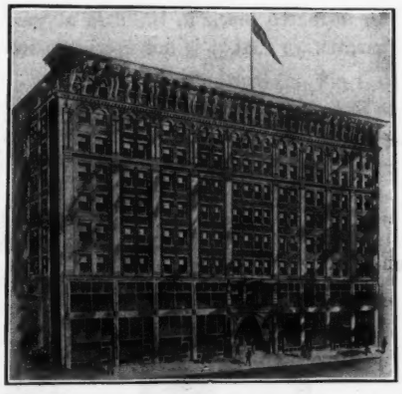
pany is to place upon the market is a magnetizing set, for magnetizing receivers, head telephones, etc.

The American Electric Telephone Company, Chicago, made most elaborate preparations for an exhibition covering "American" telephone apparatus and complete exchange equipment, in a large store on the ground floor of the Electric Building. The company sent to Cleveland, several days in advance of the convention, a staff of men who installed this apparatus and had it in operation on the first day. The exhibition comprises a complete series of the various types of exchange instruments, many forms of switchboards and an elaborate display of the "American" central energy system. The company was represented by Mr. P. C. Burns, president; J. G. Ihmsen, vice-president and general manager; Eugene S. Brown, A. W. Rousseau, H. P. Clausen and S. J. Bear.

On Wednesday afternoon, the ladies attending the convention were given a tally-ho ride through the beautiful parks and boulevards of Cleveland, through the courtesy of the Williams-Abbott Electric Company. Delegates of the various state associations met and transacted a little business during the afternoon. In the evening special cars were provided through the courtesy of the Cleveland Electric Railway Company for Haltnorth's Garden, where a theatrical performance was much enjoyed. The efforts of Mr. C. W. Wason, chairman of the local reception committee, who devoted his entire time to the entertainment of the visitors, were greatly appreciated. Mr. Murray was specially kind to the visiting newspaper men, and gave them all the help in his power.

The Standard Underground Cable Company was represented at the convention by Vice-President J. W. Marsh, Assistant General Manager P. H. W. Smith and Manager Frank Clark Cosby, all of Pittsburgh, and by the managers of the New York, Chicago and Philadelphia offices, Messrs. G. L. Wiley, J. R. Wiley and T. E. Hughes, respectively. Their exhibit consisted of sample cases showing the different styles of wire, cables and accessories for telephone, telegraph, etc. The cable samples included all sizes of rubber insulated cables, and samples up to 200 conductors; also a complete line of accessories, including terminals, arresters and cable hangers. This company has just completed the building of new factories at San Francisco, Cal., and at Perth-Amboy, N. J.

The Ericsson Telephone Company was represented by Messrs. J. H. Montague and J. F. Hemenway, in connection with the McIntosh-Huntington Company, local representatives. The goods exhibited were a genuine Ericsson imported switchboard, metallic circuit, in operation and connected with telephones in soundproof new central energy telephone. The company showed quite a large line of high grade instruments and parts, as well as its line of Rolf protectors, cable heads and terminals, both in multiples and individuals. Among the souvenirs passed out by the company was the official Western states sign button, with rolled gold frames. Also a neat letter-file, specially adapted for toll checks, for use on the switchboard. The company will be pleased to mail the files gratis to any telephone company which failed to receive the same at the meeting.



THE ELECTRIC BUILDING, CLEVELAND, OHIO, OWNED BY CUYAHOGA TELEPHONE COMPANY—CONVENTION HEADQUARTERS.

The Western Telephone Construction Company, of Chicago, made an exhibit of exchange and toll line apparatus, embracing its Western express switchboard and smaller boards for special purposes and a full line of telephones for exchange and toll line uses. This company has been entirely reorganized, and is showing a complete line of every thing used to equip a modern, up-to-date exchange. The Western Telephone Construction Company was a "pioneer" in the independent manufacturing business and deserves great credit for its progressive policy, both as to the advanced state of its apparatus, and the interest it has always taken in the welfare of the exchange owner. While the new company is entirely distinct from the old, it will continue to manufacture the well-known apparatus, and will from time to time make improvements and introduce new apparatus to keep its goods in favor with the exchanges.

EXHIBIT OF THE WESTERN TELEPHONE CONSTRUCTION COMPANY AT THE CLEVELAND TELEPHONE CONVENTION.

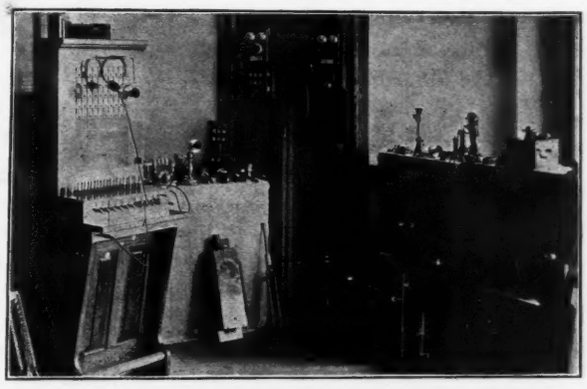


EXHIBIT OF THE EUREKA ELECTRIC COMPANY AT THE CLEVELAND TELEPHONE CONVENTION.

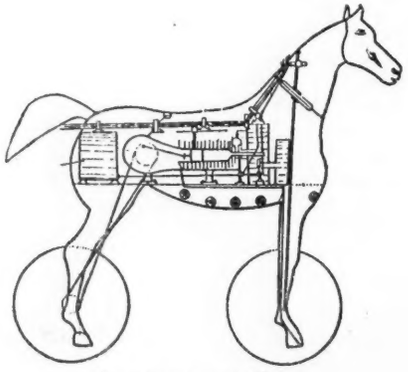
The Eureka Electric Company, of Chicago, was represented by Mr. I. J. Kusel, Mr. H. J. Kusel, who has charge of its Indianapolis office, Mr. Geo. B. Pratt, its eastern representative, and Mr. Taylor. Among the noticeable devices in its display were a Eureka metallic express switchboard, a new special transmitter, also a booths; desk sets and wall sets on the sample board, to enable visitors to use the instruments in service. The switchboard attracted a great deal of attention, and was universally admired on account of its handsome finish and appearance, positive and rapid in operation and with all parts easily accessible. Besides wall sets, desk sets, transmitters, receivers, repeating coils, lightning protectors and portable testing sets were linemen's tools, pliers and general equipment supplies.

At eight o'clock, Tuesday evening, a reception was tendered by the Cuyahoga and United States Telephone companies on the seventh floor of the Electric Building, to the delegates and their friends. The officers of both companies were in attendance to show the visitors about. There was music, a profusion of flowers and light refreshments. Every one was interested and surprised to note the completeness with which this telephone exchange has been installed; it is modern in every respect, and at present has accommodations for 5,000 subscribers. This will be increased to a capacity of 10,000 subscribers. The facilities for the employees comfort are especially complete.

A Horseless Horse.

The objection of the horseless appearance of the automobile seems to have stirred an European inventor to productive activity. In a recent issue, *British Invention* has this to say in explanation of the singular looking picture reproduced herewith:

"We thought it a somewhat curious objection to the motor-car that its one fault was that, unlike the ordinary horse carriage, it had nothing in front to steady it. Upon the first glance at our illustration it might be thought that the inventor of the automotor horse had had this very thought in mind; but the automotor horse is not intended to steady the motor-car; it is to take the place of the horse, containing within itself the motive power, by which it is to draw the carriage or con-



THE AUTOMOTOR HORSE.

veyance behind it. The motor mechanism, which is contained within the body of the horse, consists of one or two motors supported upon cross bars and driving through chains or belts the shafts of the driving wheels mounted on the hind legs of the horse, as shown in our illustration.

"The steering is effected by means of reins or rods held by the rider or driver, the neck of the horse being, for this purpose, intersected and mounted upon ball bearings, the reins being attached to a cross head mounted on a vertical spindle, to the lower end of which are attached arms contained within the forelegs and connected to the axle of the front wheels. We have no doubt that the appearance of Mr. Emile Langrenne's automotor horse in our streets will cause something of a sensation."

A Handsome Desk Telephone.

The desk telephone illustrated in the accompanying engraving is one constructed for either exchange or interior telephone work and possesses several points of merit and novelty. The transmitter is of the long-distance type and the contacts throughout the instrument are of platinum. The spring sustaining the hook lever is of a flat type instead of the usual spiral spring found on this class of instruments, and the instrument is therefore claimed to be free from the defects of weak springs so common in the older styles of desk telephone. To remove the transmitter from its mounting it is only necessary to loosen two screws. The telephone cords terminate in binding screws, mounted on an insulated block in the base of the apparatus, so that it is not necessary to unsolder the cord connections when removing or renewing a cord. The instrument is made by the Connecticut Telephone and Electric Company, of Meriden, Ct., which also manufactures a large variety of other telephone apparatus and switchboards.

A HANDSOME DESK TELEPHONE.

Wall Street and the Electrical Stock Market.

The most important development of the week affecting the stock market was the unsettled condition of affairs in China and apprehensions that the report of damage to the Spring wheat crop may be well grounded. The approaching presidential campaign is also making its influence felt, so that the week has been marked by a general decline of all securities.

On the New York Stock Exchange, General Electric closed the week at 132 bid and 132½ asked, a loss of 4 points for the week. Metropolitan Street Railway, of New York, closed at 154½ bid and 154¾ asked, a loss of 2½ points for the week. Third Avenue Railroad, of New York, closed at 111 bid and 111½ asked, a loss of 2 points for the week. Brooklyn Rapid Transit closed at 68½ bid and 68¾ asked, a loss of 3¾ points for the week. Manhattan Railway, of New York, closed at 89 bid and 89⅛ asked, a loss of 2⅜ points for the week.

On the Boston exchange, American Bell closed at 300 bid and 305 asked, a decline of 4 points in the bid price for the week. Erie Telephone closed at 100 bid and 102 asked, showing a loss of 1 point in the bid price for the week.

On the Philadelphia exchange, Electric Storage Battery stock was not quoted. Union Traction closed at 38½ bid and 38¾ asked, a loss of ⅛ point for the week. Electric Company of America closed at 10 bid and 10¼ asked, a loss of ½ point for the week.

On the curb, or outside market, in New York, Electric Vehicle closed at 25 bid and 29 asked, a loss of 1 point in the asked price. Electric Boat closed at 18 bid and 20 asked, showing a loss of 1 point for the week.

Wall street, June 9.

It is stated that funds have been secured in England to the amount of $1,000,000 for the construction of the Seattle-Tacoma Railway Company's line between those cities in Washington. The work of building the line, which has been under way for some time, within the city limits of Seattle, will be rapidly pushed to conclusion.

TELEPHONE AND TELEGRAPH

The Northwestern Telephone Company, of St. Paul, Minn., has amended its articles of incorporation, increasing its capital stock from $4,000,000 to $6,000,000.

Worcester, Mass., men have formed the Citizens' Telephone and Telegraph Company, which will be incorporated under Massachusetts laws with $300,000 capital and will petition the Worcester City Council for locations for underground conduits.

Articles of incorporation have been filed with the Secretary of State by the Valley Telephone Company, of Warren, Ark., which proposes to construct and maintain a telephone line from Pine Bluff to Monroe, La. The capital stock is $40,000, of which $15,000 has been subscribed.

The Postal Telegraph-Cable Company, of New York city, has filed with the Secretary of State a certificate of reduction of capital stock from $1,000,000 to $100,000. The paid in capital of the company is $1,000,000 and the debts and liabilities of the company are less than $5,000.

At the annual meeting of the stockholders of the Phœnix Telephone Company, of Steubenville, Ohio, the following directors were reelected for the ensuing year: J. W. Forney, R. J. Morrison, J. A. McCullough, Geo. A. Maxwell, G. G. Gaston, J. E. McGowan and C. H. Steele.

The Geneva Telephone Company, of Geneva, Ind., has been organized and will be sub-licensed by the Central Union Telephone Company. An exchange will be immediately put in. The officers are: President, A. G. Briggs; treasurer, W. B. Hale; secretary and general manager, H. M. Aspy.

The instrument statement of the American Bell Telephone Company for the month ended May 20 shows:

	1900	1899	1898
Gross output	54,340	55,302	32,441
Returned	23,868	21,265	11,948
Net output	30,472	34,037	20,493
Since December 20:			
Gross output	290,533	279,627	142,362
Returned	106,989	76,061	63,645
Net output	183,544	203,566	78,717
Total outstanding	1,764,049	1,328,808	997,838

Articles of incorporation of the Kinloch Long-Distance Telephone Company, of Missouri, have been filed with the Secretary of State of Missouri, at Jefferson City. This means that the Kinloch Company is to enter the field against the Bell Company in the long-distance service. For the present the competition will be confined to towns in Missouri and Illinois.

The Granville, Washington County, N. Y., Telephone Company has filed a certificate with the Secretary of State announcing that its capital stock has been increased from $10,000 to $30,000. The amount paid in is $10,000 and the debts and liabilities are stated to be none. The directors include: Frank E. Hicks, W. A. Tenney, F. T. Pember, F. W. Hewitt and Fred W. Allen.

The Standard Telephone Company, of Dubuque, Iowa, has absorbed the Pin Oak Telephone Company. The transfer of the property becomes effective at once. The Pin Oak was organized several years ago and the line extends from Pin Oak to Dubuque and reaches out to various other places. It has about 70 miles of wire. The Standard Company will replace the Bell instruments, which the Pin Oak Company had leased, with its own instruments and will cut the rates in half.

The Marietta Telephone Company, of Marietta, Ohio, is starting business under very auspicious conditions. The work is progressing rapidly and it is expected that the company will be able to give service by July 15. The company has contracted with the Sterling Electric Company for a complete equipment of its centralized energy, automatic flash-light switchboard equipment, adopting its complete protection and its centralized energy instruments. The company expects to commence service with at least 600 instruments.

At the recent annual meeting of the Citizens' Telephone Company, of Columbia, Tenn., the following directors were elected: Messrs. W. M. Cheairs, F. P. Brumbach, James A. Smiser, John C. Sowell, John W. Cecil, A. B. Rains, Flem Thomas, Emmett Hogue, R. Gooch, A. J. Timmons, W. B. Greenlaw, R. S. Perry, George W. Killebrew, Nelse Woolard, C. C. Collins, Willis Jones, Ed Kendle, J. L. Hutton, O. J. Porter and J. A. Bostick. At the directors meeting O. J. Porter was elected president and George W. Killebrew, vice-president.

The Massachusetts Telephone and Telegraph Company and the Boston & New York Telephone and Telegraph Company will remove their executive offices to the fourth floor of their new central telephone building, corner Pearl and Franklin streets, Boston, on July 1. The offices now used by these companies, at 15 Congress street, will then be occupied by the officials of the Erie Telegraph and Telephone Company. The Massachusetts Telephone and Telegraph Company, it is now reported, has now secured franchises in 59 Massachusetts cities and towns.

The Hudson River Telephone Company, of Pennsylvania, one of the Hudson River Telephone Company's subsidiary companies, controlling franchises in the section of Pennsylvania about Honesdale, where the company operates, has elected the following directors: Joseph P. Davis, of New York; G. W. Lane, W. F. Suydam, and A. F. Searle, of Honesdale, Pa.; Henry E. Hawley, D. Cady Herrick, and James H. Manning, of Albany. The officers are: President, James H. Manning; vice-president, A. F. Searle; secretary, W. B. Butler; treasurer, James Fitzsimmons. This little company is growing rapidly, and in the near future its local service will show a vast improvement, owing to a good deal of construction work now going on.

The annual meeting of stockholders of the Boston & New York Telephone Company was held at Dover, Del., recently. The following board of directors was elected: Charles E. Adams, Boston; Oakes Ames, Boston; Frank A. Cutting, Boston; W. H. Eckert, New York; H. E. Gawtry, New York; William F. Hallstead, Scranton, Pa.; Z. Swift Holbrook, Boston; William J. Latta, Philadelphia; Martin Maloney, New York; Joseph B. McCall, Philadelphia; Charles W. Morse, New York; Arthur S. Temple, Boston; Frank Tilford, New York; James L. Wolcott, Dover, Del. The officers of the company are: Charles E. Adams, president; John B. Stauffer, secretary; Oakes Ames, treasurer. President Adams in his annual report, said: During the past year a large amount of preliminary work has been accomplished for the establishment of a telephone exchange in Boston and other cities and towns in Massachusetts, together with the construction of a toll line between the cities of Boston and New York. Contracts for over 5,500 subscribers, covering a period of five years, to the exchange system now being constructed in the city of Boston have been received, and as a large proportion are for commercial use it is a strong indication that business men believe that the very best telephone service can be secured at much lower rates than now exist. The main exchange building that has been secured for the use of your company is a six-story substantial business structure, located in the congested commercial portion of the city, and admirably adapted for telephonic purposes. The underground work has been constructed with a view to permanency, and over 100,000 feet of duct has been laid up to the present time in the business section of the city of Boston.

LIGHTNING RODS.

WHAT SOME OF THE DAILY NEWSPAPERS THINK ABOUT THIS IMPORTANT SUBJECT.

In its issue of May 9 the ELECTRICAL REVIEW spoke its mind editorially concerning lightning rods. The daily press throughout the United States took up the matter, and so many papers have indulged in such various comments upon the article in question that it is quite interesting to gather the diverse expressions of opinion together and compare them.

The esteemed Chicago *Tribune* led off by saying:

The ELECTRICAL REVIEW says that the "chances of death by lightning are so remote as to be utterly negligible." Having made this comforting assurance it proceeds to say that the lightning rod has no more influence over the course of lightning than the color of paint on our houses. It offers a little consolation to the timid in cities by the statement that "in places where the population is closely concentrated and the buildings are close together the fatal results of lightning are practically *nil*. It is in the country districts, where trees are abundant and houses frequently surrounded by them, that fatal accidents more frequently occur." Notwithstanding the REVIEW'S cocksure remarks about "negligible chances" it is a matter of record that 32 persons have already been killed by lightning since January 1, although the season of fatality has hardly begun. If none of the existing devices for protection against lightning is of any avail, it is up to the electrical experts to suggest some which will be effective.

This expression of opinion seemed to please, for the Norwich, Ct., *Sun*, the Bradford, Pa., *Star*, the Shamokin, Pa., *Dispatch*, and two or three other papers copied it literally, without credit.

The Sandusky, Ohio, *Journal* calls a lightning rod a "thin, spectacular Ajax." It says:

Lightning rods are brought low from their towering altitude by the scientific ELECTRICAL REVIEW, which says of them: "The average lightning rod has about as much influence on the disposition of lightning to strike a building as has the color of the paint that adorns it." Not only does such an assertion, coming from such an eminent authority, strike down one of the safeguards implicitly trusted in by the suburbanite and ruralist for all these years, but it declares that the millions of money invested in so-called lightning arresters or "thunder sticks" have gone to the emolument of the iron-jawed rod agent without any compensating benefit to the misled purchaser. As swindlers, some of the lightning rod agents have passed into history as among the most stony-hearted frauds on earth, but hitherto there has been one mitigating circumstance in those questionable deals, and that is the victim got a rod—but now it turns out that the rod itself was useless except as a thin, spectacular Ajax defying the lightning. The horror of the situation stuns the senses with its stupendous expensiveness. It makes the lightning rod fiend worse than anybody thought him to be, even those who cursed him most energetically. The REVIEW rod annihilator elaborates his destructive statement by saying that it is certain that ample protection would be given to a barn by enclosing it in a thick copper shell but a lightning rod even constructed upon the most scientific principles might avail little if it came in the path of certain kinds of lightning. On the other hand, if the lightning should be of the right kind and particularly well disposed it might choose to run down the rod and spare the house and its tenants. The further suggestion is made by it that "There seems to be several kinds of lightning discharge, the two most prominent being, perhaps, best defined as the impulsive rush discharge and the oscillating stroke, striking several times over the same spot. Lightning is the discharge of an enormous condenser in which the clouds and the earth are plates, and of which the electrical capacity is simply immeasurable. The volume of the average discharge of lightning is probably not very large as compared with the heavy currents used in electric lighting and railway work, but the nearest approach that has been made to measure it indicates that it is of the order of a thousand amperes, more or less." The writer then reassuringly affirms that in cities, where houses are close together, there need be no particular apprehension of the danger of lightning as in such places the results of it are practically nothing. The city man, as a general thing, has no lightning rod, but the farmer usually has, for it is in the country that the fatalities are most numerous. In either case, however, says the scientific writer, the chances of death by lightning are so small as to be utterly negligible. Deaths by lightning in this country average about one only to every three-quarters of a million population. Some years they aggregate a hundred or so and in other years they go below 50. Yet lightning is a distressing cause of fear and annually destroys much property. So far this year there have been 31 deaths from this cause reported, while lightning rods protected none of the escaped.

The state of Ohio seems to be considerably worked up about lightning and lightning rods. The *Dispatch*, of Columbus, says, under the title "The Knell of the Lightning Rod:"

The ELECTRICAL REVIEW deals mankind a blow on the solar plexus, so to speak, when it unblushingly declares that lightning rods are no protection against thunderbolts.

The REVIEW occupies about the same ground as regards lightning that Ingersoll did regarding a future state; each attempted to deprive the world of a satisfying faith without offering any substitute. Ingersoll has gone to investigate the truth of his proposition. It is up to the REVIEW now. What substitute does it propose for our old friend, the lightning rod, that all our lives long has at least pointed the way to heaven?

The ELECTRICAL REVIEW doesn't propose any substitute. It prefers to wait until it knows more about the nature of lightning.

The Omaha, Neb., *Bee* takes the assertion that lightning rods do not protect with a sort of "we-knew-it-before" calmness. But down in Alabama the Mobile *Register* uplifts a voice of woe. It says:

The ELECTRICAL REVIEW having assailed the use of lightning rods as valueless, the same being supposed by the ignorant to give protection against lightning, the press of the country is giving the matter attention. The fact is pointed out that the average of deaths from lightning in this country is one to about three-quarters of a million inhabitants; and, therefore, liability to death from lightning, is a negligible quantity. It is comforting to some to know that they have seven hundred and fifty thousand chances to one of escaping a stroke of lightning, but there remains the knowledge that perhaps the person concerned may be that very one; so, when the lightning is zigzagging through the sky and the crash of the thunder deafens the ear, no kind of reasoning will convince some people that they are not in actual danger. Now, the lightning rod was a comforter to the believer in that instrument, and the world is not a gainer by the attack that has been made upon it; not, at least, until some good and efficient protector is found to take its place.

The Roanoke, Va., *World*, pauses from its more serious duties long enough to say:

The ELECTRICAL REVIEW says lightning rods are useless, and no more protection against lightning than the paint on the house. However, the lightning rod man will continue to ply his trade, and do well, for his talk is greater to the farmer than all the electrical journals in the United States.

The esteemed *World* seems to have reason in this connection.

The spirit of the Nutmeg State shows strongly in the remarks of the New Haven, Ct., *Journal*, which is thankful that life is secure, but distressed about the money wasted in rods. It says:

The season of thunderstorms is at hand, and it is cheering to be told by the ELECTRICAL REVIEW, which ought to know, that the chance of death by lightning is so small as to be utterly negligible. It is not so cheering to be told that the investments that have been made in lightning rods are not likely to be profitable.

The Washington, D. C., *Post* bewails

the frailty of human nature in these lugubrious paragraphs:

At one fell swoop millions of invested capital vanish, if that be true. The thousands of miles of rods, with their glittering points, reaching toward the clouds, and hospitably inviting the fluids to take free passage to terra firma, are reduced to utter worthlessness for anything but ornament, unless there be commercial value in the lesson they impart and the reminiscences they invoke of delightful interviews with the eloquent travelers from whom they were purchased. And the loss in dollars and cents, although by no means a trivial matter, is not the worst phase of the situation. There is a painful loss of faith in human nature and a sad decrease of confidence in practical science. But worse than all that, there is actual distress for those—and their name is legion—who have a mortal dread of lightning, who "tremble and grow sick at heart" when a thunderstorm comes on. Heretofore their faith in the rods and in a feather bed has mitigated their inevitable agony.

Out of all the discussion there seems to be no conclusion, but it is interesting; meanwhile lightning continues to strike where and how it pleases.

The Manhattan Alternating Enclosed Arc Lamp—A Correction.

To the Editor of Electrical Review:

A description of the Manhattan Alternating Enclosed Arc Lamp system, appearing in the Review for May 23, 1900, contained the following statement: "The regulator is of the general type employing an open magnetic circuit transformer, and an automatic regulating coil in series with the lamps."

The illustrations of the regulator were also entitled "Regulating transformer for series alternating-current arc lighting."

These statements need correction. The Manhattan regulator is in no sense a transformer. It consists of a single winding, in series with the lamps at any point, and operates solely as a variable reactance.

The regulator coil, enclosing a "W" iron core, is suspended from one end of a lever arm, the opposite end carrying a counterweight. The arm is bent to a certain critical angle, and thus a varying mechanical force is obtained, which meets the varying electrical pull of the coil, as the number of lamps is varied.

Friction is eliminated by placing the lever arm upon steel knife edge bearings, and thus regulation to within one-tenth of an ampere obtained from full load to short circuit, upon any voltage up to 8,000.

It is, therefore, evident that the Manhattan regulator should be designated simply as a "regulating reactance coil."

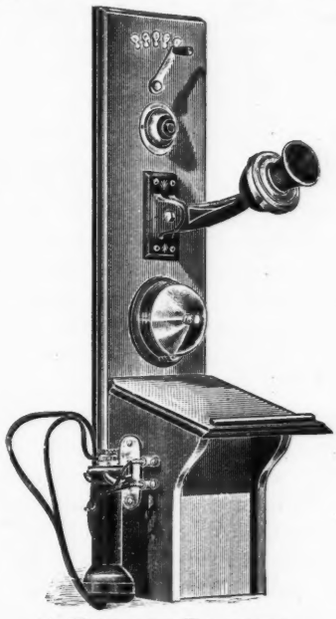
Malcolm Harlow Baker.

Newark, N. J., June 8.

Electric Lighting

The officers for the Mt. Clemens, Mich., Electric Company are as follows: President, W. S. Donaldson; vice-president, Frank E. Nellis; secretary and treasurer, Alex. Jacobi; directors: W. S. Donaldson, Alex. Jacobi, Frank E. Nellis, Frederic R. Eastman and George H. Nichols.

A decision settling the ownership of the electric lighting plant of Gettysburg, Pa., has been handed down by Judge Swope. The Keystone Electric Light, Heat and Power Company, composed mostly of citizens of Gettysburg, and the Gettysburg Transit Company, composed mostly of strangers, have been at law for



A Warehouse Telephone.

the ownership of the plant for the last three years. The home company was awarded the decision.

The contractors from Oakland who have the building of the main switching station for the Standard Electric Light Company, whose lines will pass through Mission San Jose, Cal., have started to lay the foundation for the two-story brick building. The electricity will be received from the Blue Lakes plant in the Sierra mountains on the large main wires, and distributed about the valley from this building on smaller wires.

The Vermont Electric Company, of Burlington, Vt., held its annual meeting recently. The old board of directors were reelected and they chose the following officers: President, A. E. Richardson; vice-president, Edward A. Pope; secretary and treasurer, A. C. Whiting; manager, Dr. Walter S. Vincent. The affairs of the company were shown to be in a prosperous condition. A dividend was declared and paid some time ago.

Independent Telephone Association of Wisconsin.

A convention of the Independent Telephone Association of Wisconsin was held at Madison, on June 6 and 7, the meetings taking place in the senate chamber of the state capitol. The following companies joined the association; Viroqua, Beloit, Eastern Wisconsin, Poynette, Troy and Honey Creek and Edgerton. There are now 25 companies in the association, representing six-tenths of the independent telephone interests in the state.

The matter of building connecting trunk lines for long-distance purposes was left to the executive committee. A resolution was passed providing that no member of the association shall sell any independent line to the Bell Company without first offering the same to the association, or to a member of the association. The next meeting will be held in Madison, in February.

The executive committee took preliminary steps for the constructing of long-distance lines to connect the various independent telephone systems of the state. The committee recommends that a company composed of association members be formed to build long-distance copper wire trunk lines between the larger cities of the state.

The convention was addressed by Dean Johnson, of the engineering department of the University of Wisconsin, Mr. J. J. Nate, Professor D. C. Jackson and Mr. Rall, of Chicago.

Many entertainments were provided, including steamboat and tally-ho rides. All of the delegates present were the guests of the Standard Telephone and Electric Company, of Madison, which provided handsomely for their comfort at the Park Hotel during the session of the convention. This hospitality was greatly appreciated by all who were so fortunate as to enjoy it.

A New Type of Warehouse Telephone.

The illustration shows a very simple form of intercommunicating telephone adapted for use in factories and warehouses. As will be seen from the engraving, the outfit is self-contained, all being mounted on a single backboard. It is equipped with an improved lever switch and is made for various numbers of stations up to about twenty. The receiver used with it is of the double-pole variety, and the transmitter is of the granulated carbon type. By manipulating the switch any telephone on a system may talk to any other without the necessity for a central station. This neat and attractive set is manufactured by Messrs. Thomas, Wilcox & Dietz, Cleveland, Ohio, who also make many other varieties of telephone apparatus.

ELECTRIC RAILWAYS

Plans for an elaborate system of underground terminals for the street railway lines of Chicago have been laid before the street railway commission. The entire cost is figured at about $30,000,000. Alfred J. Trebbin, engineer, is the designer of the plans.

The entire street railway system of Little Rock, Ark., has been consolidated and reorganized, the Little Rock Traction and Electric Company, which is the name of the new corporation, being a home concern. Mr. J. A. Woodson is president; Oscar Davis, vice-president; Chas. F. Penzel, treasurer, and Geo. B. Rose, secretary.

It is stated in Watertown, Mass., that the Boston Elevated Railway Company has purchased the entire line of the Newtonville & Watertown Street Railway Company, running from Union Square, Allston, through Watertown and Newtonville to Needham. While this sale is said to have been made, the papers have not yet been passed.

It is believed that the Montreal Street Railroad contemplates using electric power to be generated by the river rapids at St. Therese, Quebec. What lends color to this report is the fact that the Chambly Water and Power Company, of Chambly, Quebec, announces that arrangements have been completed for an increase in its power plant from a capacity of 7,500 horse-power to 30,000 horse-power.

Three suburban electric railway companies, the Cleveland, Elyria, Oberlin & Berea, the Lorain County and the Oberlin & Wellington, have been consolidated under the name of the Cleveland, Elyria & Western Electric Railway Company, with a capital stock of $2,000,000. The controlling interest in all three lines has been in the hands of the same men from the start. The new company has 85 miles of track.

The Tiffin (Ohio), Fostoria & Eastern Trolley Railway has been sold by J. H. Kimberly, W. H. Gabriel, Charles O. Evarts and B. G. Tremaine to F. P. Sneath, a Tiffin banker. The company was incorporated at $175,000 and was bonded up to the legal limit—$175,000. The terms of the sale are secret, but it is officially announced that the bonds were sold at par and that the shares were sold for enough more to make the total price close to $250,000.

The Atlantic City, N. J., Passenger Railway Company has elected a new board of directors. The following gentlemen were chosen: A. M. Jordan, W. H. Bartlett, R. J. Purcell, Atlantic City; Frank Reeder, Easton, Pa.; George A. Aldrich and Richard F. Loper, Philadelphia. The board subsequently elected the following officers: Richard F. Loper, president; A. M. Jordan, treasurer; W. H. Knorr, secretary. This company has about completed plans for laying tracks for a trolley through Pleasantville, and fully expects the borough council to grant it the privileges sought.

The last link in the completion of the title to the Doylestown, Pa., and Willow Grove trolley line has at length been perfected. To make the status of the purchasers under the recent foreclosure proceedings perfectly sound, a new company was incorporated under the name of the Doylestown & Willow Grove Railway Company, and William C. Ryan, to whom the road was sold nominally, together with George D. Widener, owner of all of the underlying bonds, have executed a deed to the new company for the road and its franchises. The deed was recorded May 29, 1900, in the Recorder's office at Doylestown, and the consideration mentioned as purchase money is $950,000. It is dated May 17, 1900.

A project, which has been on foot for several years, bids fair to be a realized fact in a short time. An electric railway will be built from Mineral Point, Wis., to Highland, taking in Mifflin. The land has been surveyed and preparations are rapidly nearing culmination. It is not known by what parties this railway combine is headed, but it is said there is capital enough to carry out the plan. The object is not only for ordinary traffic, but more especially for transportation of ore to the zinc works and sulphuric acid plant of Mineral Point. The demands of supply for these plants and the rapidly increasing industry of mining in this section has long needed this railway for the transit of the product.

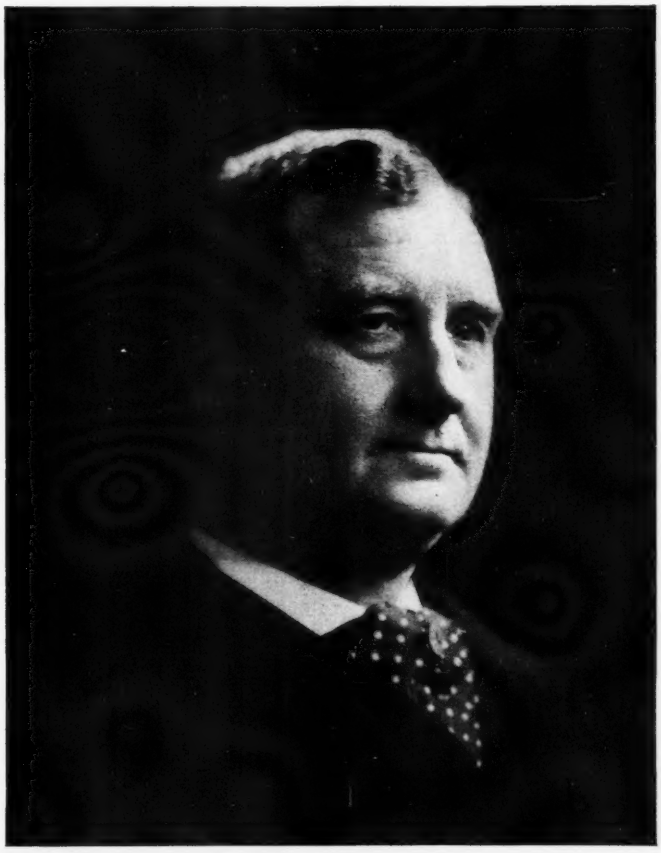
A project which will be of great benefit to eastern Kansas is being seriously considered. It contemplates the construction of an electric railway connecting the towns of Doniphan, Troy, Highland, Severance, Wathena, White Cloud and other Doniphan County towns, with Atchison. It is generally believed in Doniphan County that the B. & M. will leave its present river route within a year and build back of the bluffs. This will leave a number of towns without a road, and the electric line project is taking like wild fire. Highland has never had a railroad and wants one badly. The scheme to build an electric line originated in St. Joseph, and it was propcsed to make that place the terminus, but the expense of crossing the bridge makes St. Joseph impracticable, and it is now proposed to follow the old Hall route, which has a graded roadway, and come to Atchison. An Atchison capitalist has already been approached regarding the scheme.

The People's Tramway Company, running from Danielson, Ct., to the state line north of Norwich, is engaged in the construction of one of the largest dams in the state. The dam will cost, when finished, $400,000, and will be 20 feet high, 10 feet thick and 151 feet long. It will be used to furnish water power for the great electric generating plant that is to be constructed in Danielson next year, and that will supply electric power for the entire valley, extending 13 miles north into Massachusetts. The People's Tramway is an electric line running from Grosvenorville to Danielson, Ct., 15 miles, and was purchased last Fall by the Consolidated road. The road, when finished, will run to Webster, Mass., and south to Norwich, and will be used largely as a freight line to feed the Norwich line. The electric plant will be used to furnish power for this road and for the towns along the line.

Two more links in the chain of electric railways girdling the counties contiguous to Chicago, have taken legal form in the incorporation at Springfield of the Illinois & Rock River Railway Company, with $1,000,000 capital, and the Chicago, Fox and Geneva Lakes Electric Railway Company, with $100,000 capital. In the first named enterprise the incorporators and first board of directors are: G. E. Plumb, A. F. Milliken, Thomas C. McMillan, Ephraim Banning and Thomas Banning, of Chicago. The outlined route is from Rockford to Rock Falls, Ill., with branch lines in cities of Dixon, Oregon and Stirling; also a branch line from Rockford to the state line between Illinois and Wisconsin, a branch line from Rockford to Waukegan and branches to Cairo, Galena and Chicago. The Chicago, Fox and Geneva Lakes Railway covers a route from the east line of Lake County to a point in McHenry County on the line between Illinois and Wisconsin. Its incorporators and first board of directors are: F. V. Bissell, Clayton Cunningham, Charles A. Hill, K. S. Holmes, Albert A. Peterson and George D. Hale, Jr., of Chicago.

John G. Milburn, President of the Pan-American Exposition.

John G. Milburn, president of the Pan-American Exposition, is one of the leading members of the New York State Bar; his fame as a graceful, eloquent and forceful speaker is wide. A close approach to the American ideal citizen, not only as regards his life and abilities, but in personal appearance as well, Mr. Milburn makes a picturesque and notable chief executive of the Pan-American Exposition.



Mr. John G. Milburn, President of the Pan-American Exposition, to be Held at Buffalo, N. Y., in 1901.

He was born at Sunderland, England, December 14, 1851. When 18 years old he came to this country, beginning the study of law at once in the office of Wakeman & Watson, at Batavia, N. Y. He was admitted to the bar in 1874. In 1879 he became a member of the firm of Sprague, Milburn & Sprague, of Buffalo, a business arrangement which continued until 1882. The next year Mr. Milburn spent in Denver, but on his return in 1883, he became junior member of the well-known firm of Rogers, Locke & Milburn. Mr. Milburn has always been conspicuous in public-spirited movements, and rendered the city most valuable service as a member of the charter revision commission.

Reserve Power for the Pan-American Exposition.

Arrangements are being completed by the Pan-American Exposition Company to secure 4,000 horse-power for the exposition, at Buffalo, next Summer, in addition to the 5,000 horse-power contracted for from Niagara Falls. An auxiliary power house will be built outside the exposition grounds at the northeast corner, where power will be generated with steam and gas. A circuit of lights will be supplied with this power for use in case of any trouble with the electric power from the Falls. This will be a reserve force and will prevent any possibility of inconvenience arising from the crippling of the electrical circuits.

The Amsterdam, N. Y., and Hagaman Traction Company was incorporated a few days ago with a capital of $100,000 to operate a street surface electric road between the places named in its title. The directors are William K. Archbold and Robert R. Reid, of New York; Paul T. Brady, Robert E. Drake and Simon B. Storer, of Syracuse; J. George Kaelber, of Rochester; W. Barlow Dunlap and Lewis E. Harrower, of Amsterdam, and William H. Cornell, of Buffalo.

Electric Motive Power for "Cottage" Industries.

The Ungarische Electricitäts Allgemeine Gesellschaft and the Budapester Allgemeine Electricitäts Gesellschaft are about to make an experiment in the supply of electrical energy for power to those engaged in small industries, at an extremely low price, says our London namesake. A workshop fitted with electro-motive power is to be erected in the neighborhood of their central generating station, and those engaged in any trade which requires only a small amount of power will be able to obtain electrical power at a very small cost. The project is at the moment the subject of negotiation between the company and the minister of commerce, and if the idea is put into a practical form, its development will be watched with much interest. The subject has been thoroughly ventilated in the Austrian journals, but hitherto its treatment has been purely theoretical, as the workers engaged in the industries to which the scheme would appeal have not had the means to install the necessary electric motor in their little workshops. Statistics show that the introduction of electric power in the larger industrial applications is growing, but that so far its advantages do not appear to have been appreciated by the smaller industrial undertakings. The scheme of a central electrical workshop has this disadvantage, that the class of workers to which it is intended to appeal have their "workshop" in the same house (if not room) as the one they live in, and their customers are nearly always people living in their immediate neighborhood, and it is doubtful whether they will be persuaded to leave their present workshops and work in the central electric workshop by the inducement of cheap power. If the scheme included some arrangement whereby the expense of fitting up could also be charged for in instalments or by an increased rental for the power, the inducement would certainly be greater. The idea is not original. Somewhat similar workshops have been in operation for some time in Berlin. Several large buildings have been erected and divided up into large and small workshops fitted with electric power so that the tenant has not to fear the cost of installation. He pays a rent for the premises, and in addition pays for the current used. So far these ventures have been uniformly successful.

The latest electric railway project for western Maryland is a line from Milton to Economy, through Cambridge City and Hagerstown. The line will cross the road to be built East from Greenfield to Richmond, and will give the people of that part of the county equal facilities with those of the southern part.

INDUSTRIAL NOTES

The American Specialty Company, 123 Liberty street, New York city, has just distributed an artistic folder descriptive of a direct reading ohmmeter, which it manufactures.

The Electric Appliance Company, Chicago, are out with neat circulars, showing their No. 12 and No. 14 Bell type telephones in the different styles for series, exchange and bridging work.

Various Types of the Waverley electromobiles made by the American Bicycle Company, and all information relative to operation, management, etc., may be obtained at the New York city salesroom, 943 Eighth avenue.

The Mianus Electric Company, of Mianus, Ct., manufactures a complete line of exchange, intercommunicating and special telephones and telephone specialties, such as standard and watch case receivers, transmitters of various types, desk telephone sets, battery call systems, switchboards, head receivers, magneto bells and magneto-bell parts.

The New Process Rawhide Company, of Syracuse, N. Y., is sending out a new price-list and catalogue of its noiseless rawhide gears and pinions for electric motors and all high-speed machinery. The catalogue is sent in a heavy envelope which is designed to be used as a wallet for carrying papers in the pocket. The price-list may be obtained free on application at the above address.

The Storey Motor Company, of Trenton, N. J., has increased its authorized capital stock to $3,500,000. The company manufactures electrical supplies and has a large export trade. The company that has had the contract for the iron work used by the Storey Company is so busy that, according to Mr. Storey's statement, it has practically abandoned the Storey Company's contract.

The Tucker Manufacturing Company, of York, Pa., is enjoying quite a fine business in manufacturing telephones and electrical supplies, and is now increasing its capacity by the addition of another story to its factory building. This company recently secured a handsome contract from the United States Government for telephones, and also booked an order for Honolulu, sent to it by the Hawaiian Electric Company.

The Eureka Electric Company, of Chicago, is at work upon a triplet set, and also has a new desk set which it is placing on the market, that it expects will meet with a very large sale. The company's new central energy system should interest all telephone managers, as the instrument is adaptable to existing magneto systems without any change in switchboard. On application, the company will be pleased to furnish further and fuller particulars.

G. I. Binder—The publications of the General Incandescent Arc Light Company have become so numerous and interesting that electrical men everywhere will be glad to know that a very neat binder has been brought out which will protect them, and make reference to any of the G. I. products and prices easy. This binder, handsomely finished in black and gold, will be mailed to any one on request, and contractors, supply houses, etc., placed on the mailing list for all publications.

The Champaign & Urbana Phoenix Telephone Company has passed out of the hands of a receiver, having been purchased by a company of progressive business men of Champaign, Ill. The new company is rebuilding the entire property, moving the central offices and equipping the new exchanges with the complete outfit of switchboard, distributing board and protective devices manufactured by the Sterling Electric Company, of La Fayette, Ind. When completed these plants will be up-to-date in every respect.

The Siemens & Halske Electric Company, of Chicago, Ill., are quite busy, between eight hundred and one thousand men being employed in the shops which are quite extensive. As has been announced, the General Electric Company has purchased the stock of this company, and Mr. S. M. Hamill, well known in the electrical field, is president of the company. The shops are equipped with a considerable quantity of very fine machine tools, and quite a large product is being turned out.

The Chicago Rheostat Company is sending out under one cover its bulletins Nos. 40 and 41, descriptive of its combined under and overload starters, its motor starting rheostats, motor speed regulators, dynamo field rheostats, etc., in short, a complete catalogue of all kinds of electrical controlling machinery. The last page is entirely taken up by a half tone of the company's new factory in New York city, a splendid block, extending from 397 to 407 East Thirty-third street. Here are carried in stock all standard parts, ready for quick assembling, as well as completed apparatus, so that exceptionally good delivery is offered.

The Monarch Manufacturing Company, of Waterbury, Ct., which makes the well-known "Monarch" engine-stop and speed-limit attachment, is taxed to its fullest capacity by the many orders for its product. The "Monarch" system is deservedly popular, as may be judged by the fact that the makers have now over 60 orders in hand. Among these are systems for the Carnegie Steel Company, Pittsburgh, Pa.; the Whitehall Cement Company, Cementon, Pa.; the National Brass and Iron Works, Reading, Pa.; and no less than six outfits for the Independent Electric Light and Power Company, of San Francisco, Cal. The Monarch Company is behind its orders, but is hustling hard to catch up and keep caught up. Its works are being driven to their fullest extent to keep pace with the great growth of its business.

EXPORT NOTES

The Haushin Tramway Company, of Kobe, Japan, is considering increasing its capital stock of $750,000 about 60 per cent in order to be in a better position to undertake extensions and make additional purchases of material and equipment. The entire road, from Kobe to Osaka, will not be finished before January, 1902.

Mr. W. G. Bingham, of Adelaide, South Australia, has obtained a concession from the Adelaide City Council for the construction of electric railroads in that city. Mr. Bingham, who, according to information received by local parties, is a well-to-do contractor, has a similar concession from the Auckland, New Zealand, corporation. For these electrical undertakings, as well as for other contract work which he has on hand, Mr. Bingham is to make extensive purchases of manufactured material.

The Stave Lake Power Company, Ltd., has recently been incorporated in Vancouver, B. C., with a capital of $1,000,000. The company has acquired a waterfall on the Stave River, 42 miles from Vancouver, where power will be generated and transmitted to that city. The company will shortly make expenditures of nearly $500,000 on a new plant, and the quantity of machinery, apparatus and material which will be purchased must necessarily be large. Competition for all the requirements will be principally between Canadian, English and American manufacturers. Early deliveries, it is stated, will be a prominent feature with the company in placing contracts.

The Knickerbocker Telephone Company.

The Knickerbocker Telephone Company, of New York, has established branch offices in the Rothschild Building, Brooklyn, N. Y., corner of Fulton and Jay streets. Superintendent W. B. Larabee will be in charge of this division and Homer B. Mason, son of Superintendent Frank C. Mason, of the Police Telegraph Bureau, will be his assistant. It is announced that active work of securing rights of way, subway permits, etc., will commence at once in this new field. The New York & New Jersey Telephone Company operates in Brooklyn and Long Island and is giving modern and highly satisfactory telephone service. Just what effect the advent of the new company will have in competition with this thoroughly well-equipped and established company will be one of the interesting developments of the telephone situation.

PERSONAL.

Mr. J. C. Fish, secretary of the Shelby Electric Company, Shelby, Ohio, was in New York recently for a few days.

Mr. W. J. Clark, manager of the General Electric Company's foreign department, was a recent visitor to the Paris Exposition.

Mr. S. J. Wick, of the Electric Railway Equipment Company, Cincinnati, Ohio. has been in New York during the past week.

Mr. George H. Guy, secretary of the New York Electrical Society, has returned home after a two months' pleasure trip in Europe.

Mr. Henry Fredricks White, son of Mr. A. C. White, of the Providence Telephone Company, and Miss Mary Sheddon Darling were married on May 31, at Pawtucket, R. I. Mr. and Mrs. White will be at home after September 1 at their residence in Montclair, N. J.

Electric Railway Developments in New Jersey.

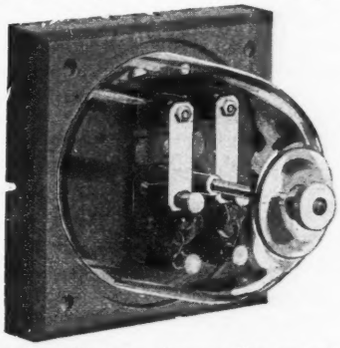
It is announced that the Bergen Turnpike Company has sold its road, six miles long, from Hackensack, N. J., to the Hudson County line to a person representing the Consolidated Traction Company. This company and the Newark & Hackensack have been rivals for a long time in an effort to reach Hackensack. It is now said that the Consolidated has been acquiring right of way from Moonachie and Little Ferry, where it can reach Hackensack by the turnpike. The turnpike was offered to the Newark & Hackensack for $60,000 and to Bergen County for $40,000. It is capitalized at $52,000, and is said to have been sold for more than par. It paid $4 dividend on each $10 share last November and $1 a share just before the sale.

A Decision in the Magnetic Blow-Out Case.

In the United States Circuit Court for the Southern District of New York, on May 18, 1900, Judge H. H. Wheeler rendered a decision in the case of the Thomson-Houston Electric Company *vs.* the Bullock Electric Manufacturing Company, generally known as the "magnetic blow-out" case. The decision was to the effect that the defendent corporation had infringed the patents of Elihu Thomson, dated April 9, 1889, and the matter was referred to a master to assess the damages in the case. A perpetual injunction was also granted against the defendants enjoining them from further manufacture of the infringing devices.

A Lightning Protector for Low-Tension Circuits.

There is no more interesting branch of applied electrical engineering than that dealing with the protection of electrical circuits and instruments from lightning and heavy currents. In these days of the general extension of high pressure and heavy currents, telephone circuits and others employing low tension and small currents are dependent upon reliable forms of interrupting mechanisms which shall open the circuit with certainty and safety, either when it becomes crossed with conductors carrying dangerous potentials, when it is violently agitated by a lightning discharge, or when it is permeated by that most dangerous variety of disturbance known as "sneak current." The device illustrated in the accompanying engraving is intended to interpose a



A Low-Tension Circuit Protector.

variety of protection that shall be certain in its action against either the violent inrush of large currents or the steady growth of the dangerous sneak variety. It is known as the Rolfe protector and operates on the heat coil principle. As is well known, this heat coil consists of a small coil of highly resisting wire imbedded in a mass of fusible material. When an unduly strong current of whatever nature passes the coil is heated and the mass of fusible material melts or softens. The protection is accomplished through this action in one or the other of two ways—either by the actual removal of the heat coil from the circuit, or by the rupture of the resistance wire in it. What the makers, the Eureka Electric Company, Incorporated, Chicago, call the class A or "Jump-out" devices operate in the former way, while the class B protectors open the circuit by breaking a section of the fragile conductor used in connection with the heat coil.

The 36 electric railway properties of the Massachusetts electric companies, with a total mileage of 759 miles, have now been combined into 14 companies, and this number will probably later be reduced to seven or eight companies.

AUTOMOBILES

The Park Board of Baltimore has made a rule excluding steam and gasoline vehicles from the parks of that city on account of the supposed greater liability of these vehicles to frighten horses. Electric carriages are admitted as before.

The citizens of Newport, R. I., and some of the Summer residents are fearful lest there be accidents this Summer due to the fast driving of automobiles. A large number of citizens has petitioned the city council to frame an ordinance for the regulation of the use of automobiles in the public streets in regard to speed and for the proper licensing of drivers of such vehicles to insure the safety and convenience of pedestrians crossing the streets. The petition was referred to a committee. There will be much opposition to the ordinance as it would require any woman or man of the Summer colony who uses automobiles to be licensed.

In view of the gradually extending use of motorcars in our own and other countries, we are led to wonder why these vehicles have yet retained their original form and look just as though the horse, which should have been in front, has somehow been lost, says the London *Electrical Engineer*. The forlorn look of the ordinary type of motorcar, especially when it is stationary, can not help striking one, and we think some change might be made in the upper construction of the car which would give it a complete appearance. The question is an old one, having been raised when the first cars began to appear in our streets, but in spite of the time which has elapsed since the passing of the motorcar act, we notice no change for the better in the shape of new motorcars.

Clearly, automobile runs are to constitute a distinct variation, we will not say in sport, but in recreation, this Summer, observes the New York *Sun*. On June 16 the members of the Automobile Club of America are to have another run of about 50 miles to Bernardsville, and on the heels of that there will be one to Asbury Park. Presumably medals, corresponding to the "century bars" of cyclists will be awarded to *chauffeurs* who make the runs within certain prescribed conditions, and it is not improbable that an "automobile face," a companion of the "bicycle face," may appear to arouse the study of physicians. Then what will be the effect of automobile runs on the nervous system? Will coasting be allowable? And will it be safe to ride "hands off?" All these are likely to be questions of club importance before the end of the year.

CORPORATION NEWS

NEW YORK CITY—The Federal Electric Company, of New York city, has been incorporated. Capital, $1,000; directors: Benjamin Blum and Nathan Blum, New York city.

FARINA, ILL.—The Farina & Vandalia Telephone Company, of Farina, has been incorporated. Capital stock, $2,500; incorporators: Thomas Zinn, Charles T. Wade and Charles W. Maxon.

GALVESTON, TEX.—The Electric Club, of Galveston, no capital stock, has been incorporated; purpose, social and literary enjoyment. Incorporated by B. S. Cloyes, F. W. Baldy and G. H. Hausinger.

PERRYVILLE, N. Y.—The Farmers' Telephone Company, capitalized at $1,000, has been incorporated. The line connects Perryville, Canastota, South Bay, Sylvan Beach and Lakeport, N. Y.

LAKE CREEK, TEX.—The Southern Telephone Company, of Lake Creek, Tex., has been incorporated. Capital stock, $2,000; incorporated by: P. W. Miller, W. W. Thompson, C. W. Hendricks and others.

PIERRE, S. D.—Articles of incorporation have been filed for the McCloud River Electrical Power Company, at Pierre, with a capital of $1,500,000; incorporators: W. H. Carlson, H. C. Balcom and T. P. Estes.

KANSAS CITY, KAS.—The Standard Electric Light Company, of Kansas City, Kas., has been incorporated; directors: L. E. James, W. J. Buchan, James Fennel, C. F. Holmes, W. E. Kirkpatrick. The capital is $25,000.

JERSEY CITY, N. J.—The Storey Motor and Machine Company, capital, $3,500,000, has been chartered to manufacture electric and pneumatic machinery. The incorporators are: R. A. Jenks, James H. Young, Rudolph Neuman, all of Jersey City.

SAN FRANCISCO, CAL.—The Keswick Electric Light Company has been chartered. Principal place of business, San Francisco. Directors: H. D. Scribner, A. F. Johns, P. S. Coke, H. C. Donnels and W. H. Bone, of San Francisco. Capital stock, $50,000; subscribed, $50.

WILL'S POINT, TEX.—The Excelsior Telephone Company, of Will's Point, Van Zandt County, has been chartered, Capital stock, $6,000; purpose, to construct and operate telephone lines in Wood and Van Zandt counties. Incorporated by John E. Owens, W. V. Wilson and W. R. Howell.

UNION, N. J.—The Electro-Magnetic Brake Company, Union, has been incorporated to manufacture an electric brake for electric elevators, etc. Capital, $50,000; incorporators: W. White, L. Fiehm, H. C. Steinhoff, L. A. Menegaux, J. S. Darling, T. D. Rabone; H. M. Earle, attorney, New York.

KITTERY, ME.—The B. & H. Electric Construction and Supply Company, Kittery, has been chartered for dealing in electrical and plumbing supplies. Capital, $30,000; incorporators: L. M. Cook, L. H. Murphy, J. Murphy, A. Brownell, all of Providence; F. E. Rowell, attorney, Kittery.

KANSAS CITY, MO.—The Metropolitan Street Railway Company, of Kansas City, has filed with the Secretary of State acceptance of the provisions of the law of 1899. This is virtually a reincorporation of the company, and the fee paid into the state treasury as a tax on the capital stock amounted to $4,275.

PARIS, ARK.—Articles of incorporation have been filed by the Citizens' Telephone Company, of Paris, Logan County. The capital stock is $2,500, of which $650 has been subscribed. The officers are: Conrad Elsken, president; G. G. Danridge, vice-president; James Cochran, secretary, and J. A. Richardson, treasurer.

TOLEDO, OHIO — The Victory Park Railway Company, of Toledo, has been chartered to operate an electric line from Hotel Victory to the Erie boat landing, furnish electricity for light, heat and power, and construct waterworks on the island. Capital, $50,000; incorporators: Charles W. Ryan, J. William Ryan, John D. Bisey, Frank J. Arbuckle and Frank W. Caughling.

TRENTON, N. J.—The American Electric Telephone Company has been incorporated, at Trenton, with an authorized capital of $3,000,000. The company is empowered to manufacture telephones and other electric appliances. Of the capital $1,000,000 is preferred, with six per cent non-cumulative dividends. The incorporators are: Barnett R. Ruggles and Henry M. Haveland, of New York, and James C. Young, of Jersey City.

CHICAGO, ILL.—Chicago, Fox & Geneva Lakes Electric Railway Company, location of principal office Libertyville, Ill., to be constructed from a point on the east line of Lake County, Ill., to a point in McHenry County, Ill., on the state line between Illinois and Wisconsin; capital stock, $100,000; incorporators and first board of directors: F. V. Bissell, Oak Park, Ill.; Clayton Cunningham, Charles A. Hill, K. S. Holmes, Albert A. Pettersen and George D. Hale, Jr., of Chicago, Ill.

NEW YORK CITY—Justice Smyth, of the Supreme Court, has appointed Lambert Schmidt receiver of the property of the firm of Schmidt & Bruckner Electric Company, of 135 Elm street, with a bond of $15,000, in a suit brought by Frederick C. Bruckner against his partner, Mr. Schmidt, for a dissolution of the partnership on account of a disagreement between them. The partnership was formed on September 20, 1897, to install telephone systems and general electrical construction work. Mr. Schmidt was the capitalist. Mr. Bruckner said that the assets are worth $24,000, while Mr. Schmidt asserts they amount to considerable less than that sum, but there is enough cash in bank to pay all the liabilities.

The Electric Street Railway in St. Johns, Newfoundland.

Mr. Martin J. Carter, United States consul at St. Johns, Newfoundland, gives the following description of the new electric railway in that city:

Electric cars are now in operation on the principal streets of St. Johns, and hundreds of people from the outskirts have come to enjoy, with the inhabitants of the city, the strange sensation of being whirled along by such peculiar motive power. The street railway is operated by the trolley system and will run 20 cars over seven miles of track; as the traffic increases the line will be extended to all the suburbs.

The current which provides the power, as well as that for lighting, is generated nine miles from St. Johns. The physical characteristics of the region lend themselves admirably to the success of this enterprise. There is a chain of four connecting lakes, and from the outlet of the last runs a flume, which is built along a steep hillside for 3,300 feet, until it disappears into a tunnel cut 350 feet through a bluff of solid rock. At the end of the tunnel is erected a huge sluice box of timber, to the bottom of which is fixed a steel tube six feet in diameter. Through this, the water drops 185 feet on a large water-wheel in the power house, which sets the machinery in motion. The largest of the lakes supplying the water has a superficial area of 31,000,000 square feet; the next, 15,000,000; the third, 9,000,000; the fourth, 1,000,000, this being used as a regulating pond. The capacity of the plant is 1,600 horse-power, but the flume is of sufficient capacity to drive another plant of like size.

The electricity is generated at the power house and transmitted to the substation in St. Johns at a voltage of 15,000.

To-day, every portion of the apparatus is in circuit, the whole running as smoothly as if it had been going for years. The water-wheel and other machinery was built by the Stillwell-Bierce & Smith-Vaile Company, of Dayton, Ohio, and the electric plant by the Westinghouse Electric and Manufacturing Company, of Pittsburgh, Pa.

The street railway is a subsidiary enterprise associated with the railway contract between the government of Newfoundland and Robert G. Reid, of Montreal, in 1898.

ELECTRICAL PATENTS

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED JUNE 5, 1900.

650,836 Telegraph sounder; Francis Hatmaker, Pittston, Pa.—Consists of a base and suitable electrical connections a sounding-post, magnets an armature and armature-lever pivotally supported in position, of an adjustable tension device for said lever, consisting of a bowed spring connected to the lever and to the lever-support, and means for varying the length of the arm of the spring, connected to the lever, to regulate the tension on the end of the same.

650,842 Electrically-controlled winding mechanism for time-locks; W. H. Hollar, Philadelphia, Pa.

650,860 Electrical connector and method of making same; T. J. McTighe, New York, N. Y.—The method of splicing electrical cables, which consists in enclosing their ends in a ductile metal sleeve and then swaging down the sleeve into intimate contact with said ends and causing the metal of the sleeve to fill the external crevices of the cable.

650,861, 650,862 Electrical connector and method of making same; T. J. McTighe, New York, N. Y.

650,873 Electric-arc lamp; W. L. Silvey, Dayton, Ohio.

650,885 Electric storage battery and conductor-plate therefor; S. Lloyd Wiegand, Philadelphia, Pa.

650,886 Secondary battery; S. Lloyd Wiegand, Philadelphia, Pa.

650,888 Electric-arc lamp; J. J. Wood, Fort Wayne, Ind.

650,905 Electrical glow-light with second class conductors; Karl Ochs, Berlin, Germany.—An incandescent lamp provided with a glower and a heater and air-circulating system and a plurality of sliding contacts whereby the said lamp may be so seated in a socket as to conform itself to the device carried by the socket for controlling the air-circulating system.

650,915 Relay for telephone-lines; C. E. Scribner, Chicago, Ill.

650,928 Suspension clamp for electric conductors; I. J. Crowley, Chicago, Ill.—A cable or wire for supporting electrical conductors, a clamp consisting of a base adapted to be fastened to a support, an outrigger adapted to sustain the supporting-cable, a strap which passes around the supporting-cable and outrigger, and means for fastening and tightening the strap, whereby the said supporting-cable is firmly clamped to the outrigger.

(Continued on page 36.)

PATENTS.

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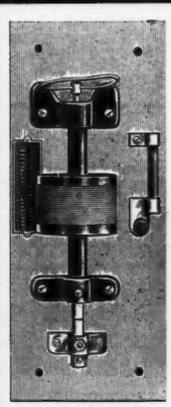

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(Concluded fr m page 35.)

650,952 Electric-railway system; W. Robinson, Boston, Mass.

650,953 Carbon-contact piece; G. A. Schoeller, Mulheim-on-the-Ruhr, Germany.

650,972 Electric conductor; L. Hackethal, Hanover, Germany — An electrical conductor covered with a fibrous material impregnated with a mixture of red lead and oil.

650,987 Electric conductor; O. P. Ostergren, New York, N. Y.

650,995 Electric punka-motor; Hein. Spuhl, St. Gall, Switzerland.

650,997 Electric-railway system; J. M. Taylor, Omaha, Neb.

651,013 Electric telegraphy; Isidor Kitsee, Philadelphia, Pa. — A device for transforming the luminosity of a vacuum-globe into sound or record, consisting of a vacuum-globe connected to a source of rapidly recurring or alternating impulses of electricity, a second circuit, containing a generator of electricity, a translating device and selenium, said selenium being placed in suitable relation to the action of said vacuum-globe.

651,014 Space-telegraphy; I. Kitsee, Philadelphia, Pa.—Consists of a stationary receiving globe or sphere provided with a receiving device and a movable shield in proximity to said stationary globe, said shield being also provided with a receiving device, and means for revolving said shield around said globe.

651,033 Manufacturing of electrical conductors; G. W. Gessner, New York —An electrical conductor of an alloy of iron and hydrogen, the hydrogen being present in such proportion as to prevent the oxidation or corrosion of the iron in said alloy.

651,044 Time-damper-operating mechanism; W. D. King, Peabody, Mass.

651,063 Insulated contact or terminal for electrical circuits; C. C. Badeau, Schenectady, N. Y.—A circuit-terminal for a high-resistance circuit mounted on a support and insulated therefrom by a bushing of fabric coated or impregnated with a high insulated material

651,067 Electric gas-lighting apparatus; W. E. Cram, Boston, Mass.

651,089 Process of producing positive plates for batteries; Hans Strecker, Cologne, Germany.

651,112 Electric controller for railway switches; H. A. Gorn, New York, N. Y.

651,198 Telephone transmitter; J. M. Moore, Chatham, Ill.—A diaphragm, electrodes rearward of the diaphragm, a spring-arm supporting the electrodes, a bridge between the electrodes, and a pressure-regulator rearward of the electrodes.

651,247 Chemical electric generator; H. K. Hess, Syracuse, N. Y.

651,248 Carbon and globe holder for arc-lamps; A. Holliger, New York, N. Y.

651,263 Electric rail bond; T. J. McTighe, New York, N. Y.—A flexible rail bond composed of solid shouldered terminals and a flexible body or cable whose ends pass axially into the riveting-studs of the terminals, and are substantially homogeneous therewith.

651,271 Electric railroad switch; T. A. Rhodes, Langdon, D. C.

651,325 Electric burglar-alarm system; J. F. Dorsey, Washington, D. C.

651,326 Electrical hose-signaling apparatus; W. Fowler, Colorado Springs, Colo.

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